

California. Dept. of Fish and Game.  
Biennial Report 1942-1944.

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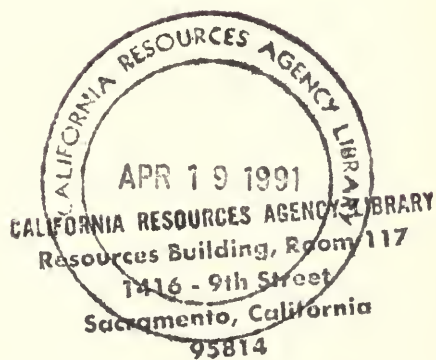
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STATE OF CALIFORNIA  
DEPARTMENT OF NATURAL RESOURCES  
WARREN T. HANNUM, DIRECTOR



THIRTY-EIGHTH BIENNIAL REPORT  
OF THE DIVISION OF  
**FISH AND GAME**  
FOR THE YEARS 1942-1944



*printed in* CALIFORNIA STATE PRINTING OFFICE



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## In Memoriam

It is with much regret the Division reports the following deaths and retirements of members of its staff during the biennium and wishes at this time again to give recognition to the faithful and efficient service rendered by these employees.

	<i>Entered service</i>	<i>Died</i>
A. R. Ainsworth-----	8/ 1/27	8/ 8/42
James L. Stinnett-----	1917	8/ 3/42
C. L. Bundock-----	1925	6/ 5/43
E. A. Chan-----	1926	4/26/43
Alvin Granstrom -----	1936	7/21/43
Charles R. Love-----	1929	8/11/43
Arthur Boeke (war casualty)-----		July, 1943

	<i>Entered service</i>	<i>Retired</i>
Henry Lencioni -----	8/27/07	9/30/42
J. C. Lewis-----	1922	9/30/42
J. D. Dondero -----	1917	10/31/42
M. S. Clark-----	8/20/11	11/30/42

## LETTER OF TRANSMITTAL

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July 1, 1944

To HIS EXCELLENCY, EARL WARREN,  
*Governor, State of California,*  
*Sacramento*

SIR: We, the members of the Fish and Game Commission, are happy to submit our biennial report covering the period July 1, 1942, to June 30, 1944.

The following report covers the activities of the various functions within the division.

Respectfully submitted.

NATE F. MILNOR, President  
DOM A. CIVITELLO, Commissioner  
LEE F. PAYNE, Commissioner  
H. L. RICKS, Commissioner  
W. B. WILLIAMS, Commissioner



## REPORT OF THE FISH AND GAME COMMISSION

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During the past biennium, appointments made to the Fish and Game Commission under the constitutional amendment adopted November, 1940, resulted in the following changes in personnel in the commission :

H. L. Ricks appointed March 6, 1944; vice Edwin L. Carty, term expired January 15, 1943.

Dom A. Civitello appointed March 15, 1944; vice Germain Bulcke, term expired January 15, 1944.

Due to the war, unusual problems were presented to the Fish and Game Commission for its action. They shall be itemized briefly here as more detail is contained in the reports of the bureau chiefs which follow.

Recommended closing of large portion of the State in Southern California to deer hunting. This originated by a request of the General of the Western Defense Command to the Governor requesting such closures due to fire hazard.

In 1943, a portion of Lassen and Modoc Counties was opened to antelope hunting for the period September 11th to September 20th and in 1944 from September 8th to September 17th.

In 1943, due to the closure of a large portion of the State to deer hunting due to fire hazard, and finding that deer had increased in certain areas to such an extent that a surplus thereof existed, a special hunting season for deer was declared for the period December 11, 1943, to December 31, 1943.

Also due to the stress of the times, it was found necessary for the Fish and Game Commission to enact regulations controlling the sardine fishing fleet during 1943. The ensuing year, this work was conducted by the office of the Coordinator of Fisheries of the Federal Government, created by an Executive Order of the President of the United States.

The work of the Fish and Game Commission was greatly handicapped by lack of personnel, but despite this shortcoming, we are proud to report that more fish were produced in the hatcheries and more game birds reared at the State game farms than in previous years.

## LIBRARY

By BESSIE W. KIBBE, Departmental Librarian

Despite the war's effect on the personnel of our division, the utilization of the Library's facilities has not diminished; the requests by those who are carrying on definite fish and game studies and projects grow daily.

There has been a reduction in the number of students and other visitors from the outside, due to preoccupation with the war, although officers and men of the Army and Navy have called upon our Library frequently for information about the natural history—especially fish—of the Pacific theatre of war.

The war has continued to prevent the receipt of most foreign periodicals, although those from Australia, New Zealand and England have come through regularly.

The Library has contributed its revised holdings to the *Union List of Serials of the San Francisco Bay Region, Supplement*, one of the important tools in libraries in this territory.

The rehabilitation of some of the Library's much-used volumes, and the binding of periodicals deemed worthy of permanent retention, was carried on.

We were able to purchase the very much desired back numbers of *Biological Abstracts*, thus completing our file of this important library tool.

The Library's shelving and floor space is gradually becoming more and more crowded.

The duties connected with the properly functioning of our division's Library, which cover so many phases and sections of any general or branch library: reference, catalog, laws and legislation (fish and game laws and reports of all States and foreign countries) and order section, have so materially increased with the steady natural growth of our Library, that it is becoming somewhat difficult for one person to carry on, in an adequate and completely satisfactory manner, all the attendant details that the management of such a Library entails. It is hoped that when more normal times return, additional facilities, both in space and assistance, may be given this Library.

The policy of the division's Library, with restricted funds permitting, is to furnish books and material helpful to our force in the studies and work pertinent to fish and game and conservation thereof. To this end, during the thirty-eighth biennial period, we have added 336 books; by purchase amounting to \$1,243.14; by gift \$188.35. The total number of bound volumes on file is 3250, with a value of \$11,772.18.

Scientific pamphlets added during this period were 718, being \$59.11 by gift; \$103.64 by purchase. Total number of pamphlets catalogued and filed are 7997, with an appraised and/or known value of \$1,385.53. Books and pamphlets represent \$13,157.71.

A microfilm reader and certain special films were added to the other property holdings of this Library, but the value of all such property is not included in this report.

## REPORT OF THE BUREAU OF FISH CONSERVATION

By A. C. TAFT, Chief

During the biennial period work has centered around an effort to maintain a normal program so far as wartime limitations would permit. Differences between this and the previous biennium are thus largely those brought about by the war.

The year 1941, just prior to the war, was the all time high in the sale of angling licenses, 458,177 having been issued. On the basis of experience in the previous World War it was expected that license sales would fall off rather severely in 1942 and 1943. This did not occur and 433,431 were issued during the first year of the period and 439,860 during the second. Even during 1944 under drastic gasoline rationing both for boats and cars it appears that the number of anglers will be within 6½ per cent of the high figure for 1941.

With angling effort remaining at a high level the problem of maintaining the supplies of fish under definite limitations as to manpower and equipment became difficult. Almost all assistant wardens, both permanent and seasonal, left the division and only 30 permanent fish hatchery assistants remained out of a normal quota of 50. Even with such temporary replacements as could be made the total manpower remained from 12 to 15 per cent below normal. In a number of instances the wives of hatchery employees and other women were hired for seasonal or part time work, which made it possible to carry on work at stations which would have otherwise been closed.

Little new equipment has been available and inability to make replacements has been most severely felt in heavy trucks, gasoline motors for fish planting equipment and tires. No new tires have been purchased since 1941 and only careful management and the utmost economy in mileage has made it possible at the same time to plant an increasing amount of fish.

In 1940 there were 133,949 pounds of trout planted and in 1941 the total was 167,647. In spite of the many problems of operation brought about by the war the poundage was increased to 238,279 in 1942 and to 275,401 in 1943. The 1943 planting was thus an increase of 12 per cent over 1942. The point has now been reached where more than a pound of trout is being planted for each licensed angler who fishes for trout. It is not to be expected that this total can be very much increased with present facilities of manpower and equipment.

The following table shows the hatcheries and egg taking stations that were operated during the biennium. Where operations were temporarily or permanently discontinued that is also indicated.



TABLE 1

## Hatcheries and Egg Collecting Stations Operated 1942-43

*Hatcheries*

Alpine, temporarily closed in 1943	Kaweah
Arrowhead, closed in 1943	Kern
Basin Creek	Kings River
Black Rock, opened in 1942	Lake Almanor
Brookdale	Madera (seasonal), temporarily closed
Burney Creek	in 1943
Central Valleys	Mount Shasta
Coy Flat (seasonal), opened in 1942	Mount Whitney
Fall Creek	Prairie Creek
Feather River	Rearing Reservoirs, closed in 1943
Fern Creek, closed in 1942	Sequoia
Fillmore, enlarged in 1942	Tahoe
Fort Seward, closed in 1943	Tallac
Hat Creek	Yosemite
Huntington Lake (seasonal), temporarily closed in 1943	Yuba River

*Egg Collecting Stations*

Fall Creek (Steelhead and salmon)	Heenan Lake (Black spotted), closed in 1943
Little Walker Lake (Eastern brook)	Kirman Lake (Eastern brook), closed in 1943
Prairie Creek and Lost Man Creek (Silver salmon)	Klamathon (King salmon), temporarily closed 1943
Rush Creek (Loch Leven)	Lake Eleanor (Rainbow), closed in 1943
San Lorenzo River (Steelhead)	Shasta River (Steelhead), closed in 1943
Snow Mountain (Steelhead)	

At the end of the biennium only four of the seven members who composed the regular biological staff at the start of the war remained on duty—Brian Curtis, Supervising Fisheries Biologist, and Joseph H. Wales, Leo Shapovalov and William A. Dill, District Biologist. The three junior aquatic biologists were on military leave, Earl Herald having left before the beginning of the biennium and Elden Vestal and Chester Woodhull at the end of 1942. Six men were employed at various times on seasonal or part-time basis, A. B. Murphy, Alex E. Culbertson, J. C. Marr, Garth Murphy, Warren R. Cheney and William H. Davenport.

The accomplishments of the staff are to some extent reflected in the list of reports and publications which follows. Routine activities were carried on such as lake and stream surveys and recommendations for stocking, for stream closures and for other forms of regulation. Projects of special interest are described below.

The life history of the steelhead and, incidentally, of the silver salmon, has been under study at Waddell Creek since 1932. Mr. Leo Shapovalov has practically completed writing up this work which will be published shortly and which will be an outstanding contribution to the knowledge of these species.

That part of the Colorado River which borders California was surveyed by William A. Dill and Chester Woodhull in 1942. The resulting report, published in July of 1944 after an exhaustive study of the data obtained, presents information about this area never before brought together under one cover and offers concrete proposals for the management and regulation of the fishery.

Experiments on the electric fish screen were carried on by J. H. Wales at Hat Creek in Shasta County where the Pacific Gas and Electric Company installed one of these devices at their Hat No. 2 Power House and made it available to us for this purpose. Here the discovery was made that if, instead of placing the live electrodes downstream from the ground as has been done in the past, they were placed upstream, there would result an electric field extending upstream from the electrodes with gradually diminishing strength. It is possible that this system will prove better adapted to the repulsion of fish of all sizes than the previously used design, where the field extended with quite uniform strength from the electrodes upstream to the ground and then ended rather abruptly. As a result of these experiments the desirability of further knowledge of the water velocities which trout of various sizes can overcome became apparent and accordingly tests on their swimming speed are now underway at Mt. Shasta Hatchery.

Lake fisheries have received much attention during the biennium. June and Gull Lakes in Mono County were under close observation by Elden Vestal prior to his induction into the Army in December, 1942, and here it was shown that planting of sized rainbow from the Hat Creek fall spawning stock at the opening of the fishing season would provide a yield of 50 per cent to the anglers' creels. Intensive studies by J. H. Wales of Castle Lake in Siskiyou County dealt with the yield obtained by planting fingerling trout of various species and showed that on the average about 5 per cent of the number planted would reach the angler's creel. The latest step here has been the introduction of soy bean meal to see if fertilization of a natural lake of this size can be a practical means of improving its fishery. Clear Lake was investigated at the request of the Lake County Board of Supervisors with respect to the effect on the sport fishery of commercial netting of rough fish and regulations were proposed under which the latter is now carried on. A preliminary survey of Millerton Lake above Friant Dam was completed and one of the Shasta Reservoir initiated. Creel counts of a less extensive nature were carried on at Stevens Creek Reservoir in Santa Clara County and at Frog Lake in Nevada County. A project for the survey of barren lakes has been carried on each summer by Mr. Dill in cooperation with the Fresno County Sportsmen's Club for the purpose of assuring proper management of these lakes from the start.

The control of rough fish in lakes through rotenone poisoning has been difficult due to the shortage of this material, but Ballard Reservoir in Modoc County has been successfully treated and brought back into production, as well as two smaller lakes in this same region, Cave and Lily.

The whole question of stream flow maintenance has received much attention, from high altitude check dams for the improvement of mountain streams to amounts of water needed for release, from dams built and to be built on our large rivers, for preservation of fish and fishing.

The Salton Sea mullet fishery was briefly investigated by Dill and Woodhull and recommendations made on which the present regulation of the commercial catch is based.

At the Central Valleys Hatchery at Elk Grove experiments were initiated which have to do not only with the production of spiny rayed fishes for stocking but also with desirable species combinations for use

in farm ponds. Interest in the latter is apparently on the increase in California.

The striped bass investigation has suffered from lack of competent personnel. A trained biologist, Garth Murphy, was employed November 15, 1943, on a part-time basis but was inducted into military service in March, 1944. During that period his work consisted principally of sampling the sportsman's catch with reference to the concentrations of fish and to their growth, food, spawning habits, etc. In an effort to get some idea of the number of striped bass taken by commercial nets, three salmon fishermen were inducted to keep records during May and part of June. These indicated one bass to every 10 to 15 salmon.

An experiment started in 1941 bore fruit in 1943. The "Kokanee," a landlocked form of the sockeye salmon very popular with fishermen in Washington and Oregon, but not found in California, was introduced into Salt Springs Reservoir on the Mokelumne River in July, 1941. These fish thrived and reached maturity in the autumn of 1943 when eggs were taken for transplanting. To the eggs thus obtained were added others purchased outside the State and the experiment is now being extended by planting these fish in several other lakes in different parts of the State.

Statistics on the angling catch were gathered as usual throughout the biennium but the 1943 report is not yet ready due to delay in processing of the material by the organization which contracted for this work when it was given up by the division's statistical department at Terminal Island because of reduced personnel. The 1942 figures showed a trout catch of 16,400,000 by 234,000 anglers as against a catch of 15,700,000 by 238,000 anglers in 1941, with an increase in the average catch from 66 to 70. The striped bass catch in 1942 was 1,760,000 by 93,000 anglers as against 2,035,000 by 111,400 anglers in 1941, the average catch remaining unchanged at 18 fish per angler for the season.

The editorship of the quarterly magazine CALIFORNIA FISH AND GAME was assigned to Brian Curtis when Richard Croker went into the Army at the beginning of the biennium.

Following is a list of the publications and administrative reports prepared during the biennium.

#### PUBLICATIONS

- Reclamation with Rotenone of Crystal Lake, Los Angeles County, California, Elden H. Vestal. Vol. 28, No. 3, C. F. and G.
- A game fish for the Salton Sea, the ten-pounder, *Elops affinis*, William A. Dill and Chester Woodhull. Vol. 28, No. 4, C. F. and G.
- Resources of the Sea in Wartime. Brian Curtis. Vol. 28, No. 4, C. F. and G.
- Twenty-five years ago in CALIFORNIA FISH AND GAME, Brian Curtis. Vol. 28, No. 4, C. F. and G.
- Twenty-five years ago in CALIFORNIA FISH AND GAME, Brian Curtis. Vol. 29, No. 1, C. F. and G.
- Twenty-five years ago in CALIFORNIA FISH AND GAME, Brian Curtis. Vol. 29, No. 2, C. F. and G.
- Twenty-five years ago in CALIFORNIA FISH AND GAME, Brian Curtis. Vol. 29, No. 3, C. F. and G.
- Twenty-five years ago in CALIFORNIA FISH AND GAME, Brian Curtis. Vol. 29, No. 4, C. F. and G.
- Twenty-five years ago in CALIFORNIA FISH AND GAME, Brian Curtis. Vol. 30, No. 1, C. F. and G.
- Creel Returns From Hatchery Trout in June Lake, California, Elden H. Vestal. Vol. 29, No. 2, C. F. and G.

- Rehabilitation of a Modoc County Reservoir for Trout Fishing, J. H. Wales. Vol. 29, No. 2, C. F. and G.
- Fish Rescue in California, Chester Woodull. Vol. 29, No. 3, C. F. and G.
- Mussel Poisoning Twenty-five Years Ago and Today, Brian Curtis. Vol. 29, No. 3, C. F. and G.
- James Moffitt, 1900-1943, Brian Curtis. Vol. 29, No. 4, C. F. and G.
- \*Black Spotted Trout in Blue Lake, California, A. J. Calhoun. Vol. 30, No. 1, C. F. and G.
- Fresh Ocean Fish as a Trout Diet, J. H. Wales. Vol. 30, No. 1, C. F. and G.
- The Tench in California, Leo Shapovalov. Vol. 30, No. 1, C. F. and G.
- Trout Fishing Restored to Modoc County Reservoir, J. H. Wales. Vol. 30, No. 1, C. F. and G.
- \**Hesperoleucus symmetricus* Reported From Clear Lake, Lake County, California, Garth Murphy. Vol. 30, No. 1, C. F. and G.
- \*The Food of the Black-spotted Trout (*Salmo clarkii henshawi*) in Two Sierra Nevada Lakes, A. J. Calhoun. Vol. 30, No. 2, C. F. and G.
- \*The Bottom Fauna of Blue Lake, California, A. J. Calhoun. Vol. 30, No. 2, C. F. and G.
- The Fishery of the Lower Colorado River, William A. Dill. Vol. 30, No. 3, C. F. and G. (In press at end of biennium).

The following were published by members of the Bureau of Fish Conservation other than the biological staff:

- Diamond-back Terrapin Introduced into California, A. C. Taft. Vol. 30, No. 2, C. F. and G.
- In Memoriam, Richard de Large, A. C. Taft. Vol. 30, No. 2, C. F. and G.
- John Otterbein Snyder, A. C. Taft. Vol. 30, No. 1, C. F. and G.
- Selective Breeding of Rainbow Trout at Hot Creek Hatchery, R. C. Lewis. Vol. 30, No. 2, C. F. and G.
- Golden Trout Propagation in California, George McCloud. Vol. 29, No. 4, C. F. and G.

### ADMINISTRATIVE REPORTS

#### Brian Curtis

- Angling Catch Records, 1942. Submitted April 24, 1944.
- Angling Catch Records, 1941. Submitted July 10, 1942.
- The Frog Lake (Nevada County) Fishery in 1943. Submitted March 1, 1944.
- The Frog Lake (Nevada County) Fishery in 1942. Submitted January 12, 1943.
- Fisheries Aspects of South Fork of Stanislaus Stream Flow Maintenance Surveys. Submitted September 14, 1943.
- Report on Check Dam Reconnaissance in Silver Lake, Amador County Area. Submitted September 16, 1942.

#### Joseph H. Wales

- Poisoning of Cave and Lily Lakes, Modoc County, October 18-19, 1943. Submitted November 30, 1943.
- General Report on Lake Almanor, Plumas County. Submitted December 10, 1943.
- Castle Lake Report for 1943. Submitted March 17, 1944.
- Castle Lake Report for 1942. Submitted January 13, 1942.
- Report of Investigations on Clear Lake, Lake County, California. Submitted April 10, 1943.
- Report of Tests Made at the Hat No. 2 Electric Fish Screen, June-July, 1943. Submitted August 12, 1943.
- Diversion of Water From the Pit River to the Pacific Gas and Electric Pit 5 Power House. Submitted March 12, 1944.
- Summary of Weekly Disease Reports for 1943. Submitted March 15, 1944.
- Summary of Weekly Disease Reports for 1942. Submitted March 2, 1943.
- Shasta Valley Fish Screens. Submitted January 14, 1944.

#### William A. Dill

- Tule Indian Reservation Project, Report on 1942 Fish Marking and Planting. Submitted October 14, 1942.

\* Publications based on work performed by the author while employed by the Division of Fish and Game.



The Inland Mullet Fishery of California, Report No. 2. Submitted November 10, 1942.

A Preliminary Report on the Potential Fishery of Millerton Lake With Suggestions for its Management. Submitted April 9, 1943.

A Fisheries Survey of the Upper Bear Creek Drainage, Fresno County, California. Book I, General Account; Book II, Detailed Surveys of Individual Waters. Submitted May 28, 1943.

Tule Indian Reservation Project, Report on 1943 Fish Marking and Planting. Submitted October 1, 1943.

Stream Closure in Tulare County: Boulder Creek. Submitted June 5, 1944.

Preliminary Suggestions for Postwar Projects, Fresno Biological District. Submitted June 15, 1944.

The Colorado River Survey, 1942. Book I, Dams, Diversions, Pumps. Submitted June 26, 1944.

#### **William A. Dill and Chester Woodhull**

The Tule River Indian Reservation Creel Count, 1942. Submitted August 21, 1942.

The Possibilities of Increasing and Maintaining a Run of Salmon (*Oncorhynchus tshawytscha*) in the Kings River, California. Submitted September 10, 1942.

#### **William A. Dill and G. S. Gunderson**

Hatchery Sites, Tulare County: Moorehouse Creek Spring. Submitted September 30, 1943.

## REPORT OF BUREAU OF GAME CONSERVATION

By J. S. HUNTER, Chief

The need for a better understanding of the problems of conservation by all interested has been very apparent during the past biennium. With the need to produce more food it has been necessary to give consideration to all those causes that result in less production, and with the higher value of agricultural crops the loss of any portion of the crop has been more apparent to the producer. Wildlife that reduces crop production is regarded by the extremist the same as insect pests and should be destroyed. Fortunately such people do not predominate and wildlife, generally, is regarded both for its intrinsic and aesthetic value. It is, however, necessary for the conservationist to give consideration to the damage that is or may be caused and to develop protective measures that will keep the loss to an inconsequential minimum. Under normal conditions this is a difficult problem but under conditions that have prevailed during this biennium it has been stupendous.

There are several areas in the State where deer have caused many complaints. In the Stonyford area, in the Sacramento Valley, a study was made of the situation and it was agreed by all interested parties that if a brush area were burned in the area adjacent to the farming section, it would relieve the situation but after consent had been secured from the State Department of Forestry, the permit allowing burning was canceled and we were unable to carry out the experiment.

In Modoc County there have been complaints from stock interests that deer were destroying browse and feed and it was no longer possible to carry the same number of cattle as had been grazed in previous years. The deer that caused the damage moved into California during heavy winters from Oregon and in order to relieve the situation the Oregon commission has had an open season on does since 1941. During that time some 4,574 antlerless deer have been taken. From recent studies we find this has greatly relieved the situation.

In the Doyle area of southern Lassen County a study was carried on by the staff of the Bureau of Game Conservation to determine the extent of damage to farmers by Rocky Mountain mule deer and the approximate number of deer involved. This problem is still being studied with a number of proposals being considered to alleviate the damage. Land acquisition, herding and herd reduction have all been proposed, and all of these may be used in part to remedy the situation.

The increase of waterfowl during the past several years has brought about many complaints from certain agricultural areas, particularly in the rice fields of the Sacramento Valley and the rice and other fields in the Imperial Valley. Progress has been made in reducing this problem and we hope to be able to solve it.

Botulinus has been prevalent at Tulare Lake since the area was flooded in 1937. Mr. D. D. McLean has carried on investigations in that region and reports as follows: Botulinus or duck disease was active at

Tulare Lake in 1942 but to a lesser degree than in previous years. The 1943 infection was about the same as in 1942.

1942—461 ducks picked up—388 banded and released—73 lost  
1943—576 ducks picked up—484 banded and released—92 lost  
15.6 per cent loss in 1942  
16.2 per cent loss in 1943

For comparison the 1941 figures show: 5,711 ducks picked up; 4,912 banded and released; 799 lost, 13.9 per cent loss. The radical difference in the number of sick birds was evidently due to the change made by the farmers in the management of their irrigation water during the late summer and fall. They began the new system in 1942, whereby the water was kept moving from one field to the next lower one as soon as the first field was flooded and soaked. The intervening levee is cut and the water kept moving from one field to the next until the irrigation is completed. On completion of the irrigation, water is pumped back into the lake. This system keeps the water moving and does not give the vegetation time to start decomposing in the warm standing water. The old system of allowing fields to remain flooded for weeks at a time found the water temperatures rising and heavy decomposition with a corresponding decrease of oxygen content in the water. The botulinus bacillus thrived in such a medium. Under the new system most of the duck disease was found in low, undrained spots on the fields and in barrow pits.

The fall duck population has increased steadily in the Tulare Lake region each year since 1938. The 1942 and 1943 peak populations were not radically different. The 1942 peak was on or about October 8th, when 3,500,000 were estimated to be in the area, and the 1943 peak was on October 10th, with 4,000,000 birds estimated to be present.

Water surface temperature, bottom temperatures, sun temperatures, shade temperatures, wind direction and velocity, and general weather conditions were noted and correlated with the severity of the disease.

Intensive study has been given the problem of providing shooting areas for unattached duck hunters. To R. E. Curtis, a member of the staff, was given the task of working plans of procedure and operation. His approved report follows:

#### **WATERFOWL PUBLIC SHOOTING GROUNDS IN CALIFORNIA**

##### **Suggested Management Practices and Estimated Costs**

##### **Objectives**

Waterfowl management in California presents problems that are probably unique in the United States. Reclamation has reduced and agriculture has encroached upon the natural waterfowl habitat to an extreme extent.

Public shooting grounds in this State will have two principal objectives: (1) To provide the unattached hunting license holder with a place to shoot at reasonable cost. (2) To control and minimize waterfowl depredation on agriculture.

To accomplish the first purpose it will be necessary to bring under control of the Division of Fish and Game, by purchase, lease, or otherwise, large tracts of strategically located, suitable land, and to so administer these areas that the greatest possible number of hunters may be accommodated with reasonably good shooting.



The second objective can be secured by: (a) Providing on the shooting grounds food and habitat that will successfully compete with the surrounding agricultural lands. (b) Maintaining, through hunting, a waterfowl population level commensurate with the available food and habitat.

#### **Methods**

Methods of land acquisition do not require discussion here.

Plans for operation and administration of public shooting areas must be carefully considered. There is little practical experience from which to draw information. Public shooting grounds operated by the U. S. Fish and Wildlife Service are, in the main, not comparable to conditions that must be met in the Sacramento-San Joaquin Valleys. Large commercial clubs furnish the most comparable conditions, but since their objectives are confined to furnishing reasonably good shooting and making a profit, much of their methods are not applicable.

Subsequent to acquisition of suitable lands the operations to be considered are: (1) Engineering development; (2) Food crop planning, planting, and management; (3) Administration of the hunting.

#### **Engineering Development**

A reasonably detailed topographic survey is the first requirement. From this data the plan of ditches, dams, and other water control structures can be formulated. In the completed development, water area should approximate one-third of the total.

Under California conditions it is doubtful that all water areas can be maintained continuously. However, as much water area as possible should be maintained at constant level in order to promote aquatic vegetation and minimize the possibility of botulism epidemics.

Water distribution and control structures should be simple to operate and of durable construction. In times of water shortage it should be possible to drain higher ponds, successively into lower ones, in order to retain optimum conditions in at least the lowest structures.

Engineering and development costs will vary with the terrain and it will not be possible to obtain the optimum balance of one-third water, two-thirds land for reasonable cost at all points. On the most suitable terrain these costs should not exceed \$10 per acre, but over all it will be safer to allot a cost of \$15 per acre for this purpose.

#### **Water Supply and Cost**

Adequate water supply is the primary necessity for waterfowl developments. In certain localities water rights appurtenant to the lands or agricultural drainage waters may provide this necessity at little or no expense. In considering the over-all plan, it will be more practical to assume that all water must be purchased at prevailing agricultural rates.

Rice growers commonly obtain water for \$1.25 per acre-foot, and this figure is here accepted as the probable average cost for the entire project. It is estimated that in order to provide irrigation, to offset evaporation, seepage, transpiration, and other losses, enough water should be provided to cover the entire area three feet deep each year. Since only one-third of the entire area is to be submerged, this three feet over-all would provide nine feet per year for the pond area. This amount

should be adequate to offset losses from the submerged area and to provide crop irrigation on the rest.

The water cost would thus be \$3.75 per acre per year for the entire area. This is believed to approximate the maximum cost for gravity water. If it is necessary to resort to pumping of subsurface water, this figure will probably be exceeded.

### Crops

In order to relieve crop depredation during the entire time waterfowl are in the State in numbers, and to hold them on the shooting grounds during the hunting season, it will be necessary to grow as much food as possible on these areas. Artificial feeding is barred by Federal regulation on the shooting grounds.

Suitable food crops include rice, wheat, barley, oats, rye, millets, watergrass, nonsaccharine sorghums, corn alfalfa, clovers, and aquatic plants.

Numerous rice growers have expressed doubt of the ability of any other grain crop to compete with rice as a waterfowl attractant. This remains to be proven. The high cost of producing a rice crop argues against its use on public shooting grounds, unless other and cheaper crops fail to produce the desired result. It is believed that the common small grains, particularly wheat and barley, properly handled, will serve the desired purpose adequately. The millets (watergrass) are very attractive to waterfowl and are commonly used by blackbirds.

The small growing, nonsaccharine sorghums, such as doubledwarf milo, are readily taken by waterfowl, are economical to produce, and should be used, especially where late planting is necessary.

Along the Mississippi flyway field corn constitutes one of the important waterfowl foods. It should be experimented with here in suitable locations.

In certain locations on the areas under consideration it is reported that "goose-grazing" effectively prevents the production of small grains. In such locations alfalfa, Ladino clover, or perennial burnet should provide a solution to the food problem.

Aquatic plants provide a considerable part of the food of many waterfowl species. Much remains to be learned regarding the successful management of aquatics under California conditions. Most of the native varieties will appear naturally if water conditions are favorable. In new water areas artificial planting will probably be justified. Fertilization of pond waters is a new development and should be studied in this connection. Exotic aquatic species should be tried on an experimental basis. To date, the most favored eastern species, wild rice and "wild celery," have not proved successful in this State.

### Cropping Methods and Costs

Three means of producing crops on the state-owned lands have been suggested: (1) Share-cropping; (2) Contract planting; (3) Use of State personnel and equipment.

Share-cropping in this case does not appear to be a practical solution since the primary object in producing the crop is to feed waterfowl, not humans or domestic stock. It would defeat the purpose of the project to drive waterfowl away from the crop. The landowner's share is commonly only one-third.

Crop planting by contractors affords arguments both pro and con. Utilization of this method will relieve the State of the necessity of purchasing and maintaining large quantities of farm machinery. Labor personnel problems will be simplified. Seed furnished by the contractor will eliminate a purchase problem.

On the other hand, the contractor will expect to make a profit on the operation, thus increasing cost. The slow, cumbersome process of awarding State contracts and delay in payments will deter many bidders. Those best fitted to do the work, the local agriculturalists, will do their own planting at the most advantageous time and plant State crops either early or late.

Crop production with State personnel and equipment should be tried on a small scale and expanded if results are satisfactory. Some suitable equipment must be owned by the project for maintenance and its utilization in crop production will be economical.

#### Crop Production Costs

Small grains are expected to form the backbone of the project program. Seed bed preparation, seed, and seeding should not exceed \$5.25 per acre under any foreseeable circumstances, and under normal conditions should be less. Itemization follows:

Plowing -----	\$2.00 per acre
Discing -----	.50 per acre
Drilling -----	.50 per acre
Seed -----	2.25 per acre (90 ¢ at \$2.50 cwt.)
Total -----	\$5.25

It is estimated that not over 50 per cent of the entire area will be planted in any one season, the remainder being 33½ per cent water, 16¾ per cent waste and grassland. Thus, an average cost of \$2.625 per acre is assignable for the entire tract.

#### Utilization of Crops—Grazing

A large part of the lands proposed for acquisition are essentially pasture land at present. Minor portions are cropped to barley, rice, milo, and beans. Under management as public shooting grounds the most practical economic agricultural by-product of these lands will be pasturage. The cash return from this source under present usage averages \$3.50 per acre annually. Under game management the grazing intensity and season will be restricted, but the quality and quantity of forage will be increased. Allowable grazing should bring a minimum cash return of \$2 per acre per year.

In normal years a short period of spring grazing (when land is dry enough) can be permitted. This procedure is generally beneficial to grain crops. As soon as grain is matured, pasturage will again be permissible.

It has been found in similar operations at Honey Lake (Lassen County) that grazing cattle on matured grain serves to shatter a large part of the grain onto the ground where it becomes available to waterfowl and pheasants. If grazing is not practiced, it is necessary to drag down the standing stalks or to flood the land to make the grain available to waterfowl.

Pasture cattle should be removed before the shooting season unless owners sign waivers for damage and loss.

Pasturage by sheep should not be allowed in most cases. Their use may be permissible under special conditions as where it is desirable to remove weed growth.

#### Payments to Counties in Lieu of Taxes

It is anticipated that strong objection to State acquisition of large tracts of lands will arise unless some means is devised to compensate the respective counties for loss of tax revenue. Legislative action will be required before this is possible. Such payment should be limited to the amount of taxes levied at the time of acquisition. The type of lands being considered are largely marginal so far as agriculture is concerned. On the basis of current land values and tax rates, the charge for this item should not exceed 50 cents per acre annually.

#### Hunting Management

This will unquestionably be the most difficult phase of the entire program. The term "public shooting ground" will convey to many the idea of free and unrestricted use by any or all individuals. This will not be possible. All applicants can not be accommodated at any one time. Some system of accepting and acknowledging applications must be devised. Priority of requests appear to be the only fair basis of assigning hunting privilege. To produce a workable system will require much thought, effort, and experience.

Cost of permits must be kept substantially lower than charges by commercial clubs if the plan is to benefit the hunting public. Charges for the first season must be estimated as closely as possible; thereafter charges should be modified annually in conformity with the previous year's actual costs.

What expense shall be considered in determining permit charges? If initial cost of the land is met from accumulated license fees, paid in part for this specific purpose, then no attempt to recover cost of the land through permit fees is justifiable. Development, maintenance, and operating costs can and should be met by permit fees.

Development costs should be amortized over a considerable period of years, not less than 10, and preferably 20. Over a 20-year period the permit fee attributable to this source would be 75 cents per acre per year. Other costs to be added to the permit fee are outlined and summarized below.

It is believed that a minimum of 20 acres should be allotted to each double blind, or 10 acres per permittee. In addition, one-third of the entire area should be closed to shooting each season to provide unmolested feeding and loafing space. This will avoid driving the birds from the tract when the season opens. Thus 15 acres becomes the actual minimum for each hunter and is the unit on which the fee per shooter day must be calculated.

If salaries of employed personnel are to be charged to the hunter, they can be estimated as follows:

Two permanent employees for each 5,000 acres-----	\$4,800 per year
Extra seasonal labor for each 5,000 acres-----	2,700 per year
Total -----	\$7,500 per year



This amounts to a charge of \$1.50 per acre yearly.

Maintenance costs (structural repairs, weed control, etc.) should not exceed \$1.50 per acre.

#### Summarization of Annual Costs

<i>Item</i>	<i>Cost per acre</i>	<i>Cost for 15-acre Unit</i>
Development (20-year amortization)-----	\$7.75	\$11.25
Planting (one-half of entire area)-----	2.63	39.45
Personnel cost-----	1.50	22.50
Water-----	3.75	56.25
Payment in lieu of taxes-----	.50	7.50
Maintenance-----	1.50	22.50
Total yearly cost-----	\$10.63	\$159.45
Less income (pasturage)-----	2.00	30.00
Net annual cost-----	\$8.63	\$129.45

Under the present season there is an average of 35 shooting days per year (three per week plus opening, closing, and holidays). The cost per man per day thus becomes \$3.70 ( $\$129.45 \div 35$  permits). It is reasonable to assume that a small percentage of hunters will not take up their reservations. If this is assumed to be one in seven, the charge becomes \$4.32 for each permit ( $\$129.45 \div 30$ ).

It has been suggested that the guide plan used by the U. S. Fish and Wildlife Service on their large public shooting ground in the Dakotas be followed. Here, we understand, a guide is required for each double blind, the occupants furnishing his wages of \$7 per day as part of their permit fees. It is believed that conditions in Dakota are quite different from those that would prevail on California shooting grounds. Travel to and from blinds is probably by boat, making it practical for a guide to serve only one blind. If the guide system is adopted in this State, it may be practical for a guide to serve as many as four blinds, thus reducing the guide cost per shooter to \$1 per day, wage being assumed to be \$8 per day.

#### Pheasant Shooting

Under the management plans outlined above, a heavy pheasant population may be expected to develop on the shooting grounds intended primarily for waterfowl. The pheasant hunting season comes within the waterfowl season, but if pheasant hunters were allowed to operate at the time waterfowl blinds are occupied, waterfowl shooting would be spoiled. It is suggested, therefore, that all pheasant hunting on these lands be limited to regular waterfowl shooting days, that the one permit fee pay for both types of hunting, and that pheasant hunting be limited to the period between 10 a.m. and 3 p.m.; before and after these hours all hunting to be restricted to occupants of blinds.

#### DEER, ELK AND ANTELOPE

Regulations promulgated by the Fish and Game Commission at the request of the War Department restricted the deer season in 1942 to 21 days in the counties on the coast from Santa Cruz to Mendocino, inclusive, and prohibited the hunting of deer in Southern California, including San Luis Obispo, Santa Barbara and Ventura Counties. In the Sierra

region hunting was prohibited below Ponderosa Way, approximately 2,500 feet elevation. This prohibition reduced the kill to 25,902 as against 43,493 for the year previous. In 1943 deer hunting was prohibited by the War Department in the coast counties and in Southern California. The take in the counties opening September 16th totaled 21,882. In view of the fact that there had been no open season in Southern California for two years, the commission declared an open season in the southern counties and in Monterey, San Benito, San Mateo, Santa Cruz, and the western portion of Santa Clara, Merced and Fresno Counties, from December 11th to December 31st. Three thousand three hundred twelve deer were taken during this season.

Questionnaires were sent to nearly 3,000 successful hunters in which they were asked pertinent questions. Only in Los Angeles and San Bernardino Counties were the hunters in favor of a winter season. Few hunters reported fat deer and the general opinion was that the animals were from 25 per cent to 30 per cent underweight. In many instances, antlers were loose and in some localities bucks had already dropped their antlers. Those that favored a winter season did so on account of the cooler weather and less fire hazard. Those against, on account of the condition of the animals.

Acting under the authority of Section 39.1 of the Fish and Game Code, the commission in 1943 had an open season on elk in the Owens Valley. Hunting was permitted from December 4th to 11th. Seventy-five permits issued allowing the taking of one bull each. Forty-three animals were taken. The largest with the viscera removed weighed 490 lbs. Following are the measurements: Antlers, right 38.5"; left 36"; spread 43"; tip to tip 40.12"; base, right 9.12"; left 9.6"; number of points, right 6; left 6.

In 1943 the commission again opened the season on antelope, fixing the dates September 8th to 20th, inclusive. The same procedure in issuing permits was followed as had been used in the 1942 season. Five hundred permits were issued. Eighty-seven per cent of those who hunted were successful and took 362 antelope.

The antelope census was carried on by airplane as in the past with a favorable increase in numbers being indicated. In 1943 the count was 5,338 and in 1944, 6,147. The 1942 count was 3,752. These counts were made in Lassen, Modoc and Siskiyou Counties on the known winter ranges. One band of 171 was found in Shasta County near Fall River Mills, in 1944.

Study of parasites and diseases of game has been continued by Dr. Carlton M. Herman. His report follows.

#### PARASITES AND DISEASES

During the period covered by this report there have been many cases of evidence of disease causing loss in deer populations, primarily in the coastal counties and particularly in Mendocino and Sonoma Counties, although the same condition occurs more or less from the southern part of the State to Humboldt County, as well as in Lake and Trinity Counties.

Examination of a number of animals seems to point to the roundworm infections of the upper digestive tract as the most frequently occurring disease condition, and to such an extent that much of the losses could be attributed to this infection. A number of species of round-

worms occur, all causing the same general pathology and all having similar direct life cycles. Most of them are common parasites of sheep and cattle and were undoubtedly introduced into this country with the domestic flocks and herds.

The extreme irritation to the intestinal tract usually causes a diarrhetic condition referred to as scours. It is usually more evident in the younger animals. The developing eggs of the worms pass out of the intestinal tract with the deer's droppings and the larval worms hatch out in the soil. After a period of development they become ripe for infection and migrate up moist blades of grass. Deer (or cattle and sheep) become infected when they eat such contaminated grass.

Many factors are involved in the ultimate condition of deer as a result of these parasites. Some of these are temperature, moisture, the extent of use of the pasture by infected deer or livestock, and the amount of grazing done by the deer on such infected areas. In point of sequence this last factor seems to be the most important in the health of the deer population. Where these infections are the only ones involved in reductions of deer, a direct proportion can be hypothesized between the amount of grazing and the extent of the losses. The more browse available, the less infection with these worms. It is mainly in areas where deer would be most likely to live chiefly on a grass diet that this condition becomes severe. In areas where it has not been observed, or where the severity was of little significance, the stomach contents of the deer examined showed a predominance of browse.

In March, 1944, in collaboration with the U. S. Park Service and U. S. Fish and Wildlife Service, an investigation was made of deer conditions in the Sequoia National Park. Here, again, these intestinal worms were found to be of much importance. In this area, too, deer are suffering from intensive eyeworm infections. All deer infected with these small worms in the eye at Sequoia have upwards of 30 worms per eye, whereas when we have observed the same infection in deer in other parts of the State, very few worms have been present.

Our program on the occurrence of blood parasites of quail has been continued, although reduction of field personnel has greatly reduced the number of samples. With the cooperation of the Associated Sportsmen of California and other hunters, we have obtained many samples of blood and hearts in an effort to determine the distribution of these diseases. This program shall be continued and expanded. As a result of our studies on quail we have uncovered at least three important parasites new to science. As a part of this program we are studying the parasites of other species of birds to determine what diseases are common to all birds as well as those that occur only in our game species.

Two winter outbreaks of botulism were observed in ducks and coots: (1) Gridley, with varying intensity during winter 1943-44; (2) Mt. Eden, January, 1944.

Preliminary investigations were made on the source of so-called "iodine" ducks in the lower San Francisco Bay area during the 1943 duck season and plans have been formulated to make an intensive investigation of this condition during the 1944 season.

Numerous other parasites and diseases were diagnosed in the wildlife of the State and investigations on the epidemiology of many of the



parasites are in progress. A total of 614 birds and 149 mammals were autopsied.

The following papers were published:

#### 1942

Reducing Coccidiosis in California Quail During Captivity. California Fish and Game 28:148-149.

The Protozoan Blood Parasite *Haemoproteus lophortyx* O'Roke in Quail at the San Joaquin Experimental Range, California. California Fish and Game 28:150-153.

Coccidiosis in California Quail. Condor 44:168-171.

#### 1943

The Occurrence of Blood Parasites in Birds From Southwestern United States. Jour. Parasitology 29:187-196.

Food Habits and Intensity of Coccidian Infection in Native Valley Quail in California. Jour. Parasitology 29:206-208.

Fungus Disease in a Glaucous-winged Gull. Condor 45:160-161. A parasite in the muscles of ducks in California. California Fish and Game 29:148-149.

Epidemiological Studies on Coccidiosis of California Quail. I. Occurrence of *Eimeria* in Wild Quail. California Fish and Game 29:168-179.

An Outbreak of Mycotic Pneumonia in Mallards. California Fish and Game 29:204.

Parasites of Cottontail Rabbits on the San Joaquin Experimental Range, California. Journal Wildlife Management 7:395-400.

Giardia in the Blood of a Kangaroo Rat. Journal Parasitology 29:423.

#### 1944

Eyeworm (*Thelazia californiensis*) Infection in Deer in California. California Fish and Game 30:58-60.

A parasite from antelope in California. Transactions American Microscopical Society 63:27-29.

Notes on the pupal development of *Stilbometopa impressa* (Diptera Hippoboscidae). Journal Parasitology 30:112-118.

Preliminary arrangements have been made to obtain more adequate quarters to house the laboratory on the Berkeley Campus of the University of California. The achievement of this move will also afford better library facilities and cooperation with various specialists on the University faculty.

#### PITTMAN-ROBERTSON

As a direct result of the war the appropriations made by Congress under the Pittman-Robertson Act were considerably reduced during the biennium. This action on the part of Congress generally met with the approval of the States who were fearful that the manpower shortage, the lack of essential materials, and soaring land prices would make it impossible to spend normal appropriations.

As it was, California received allotments totaling \$91,717.86, which brought the total of Pittman-Robertson money allotted to California since the inception of the program to \$398,233.28. Since, according to the terms of the act, a participating State must contribute an amount equal to one-third of the Federal apportionment, the amount that has actually been made available for wildlife restoration in California is now more than one-half million dollars. Of this sum, \$457,570.72 had been obligated at the close of the biennium.

Seventeen projects have been undertaken up to the present time. Eleven of these were begun during the 1940-42 biennium; six were completed during that period, and five were continued after July 1, 1942.

Four new projects were begun during 1942-44, bringing to nine the total number of projects on which work was done during the period covered by this report. Three of these projects came under the heading of surveys and investigations, four were development projects, and two involved the acquisition of lands.

Following is an account of the wildlife restoration work accomplished under each of the three project categories.

#### **Surveys and Investigations**

A five-year study of California's fur resources, Project 5-R, first undertaken early in the spring of 1941, was continued through this biennium. Particular emphasis was placed on the accumulation and analysis of both quantitative and qualitative data pertaining to California's annual fur crop. Although the shortage of manpower necessitated the discontinuance of intensive studies of the biology and management requirements of all of the various kinds of fur bearers in the State, it was possible to give some attention to two of the most important species, the beaver and the muskrat. The experimental planting of beaver has been generally so successful that plans are being made for an intensive beaver management program in the immediate future.

The investigation of methods that can be used in connection with valley quail management, Project 6-R, is another five-year study that was continued during the biennium. The general survey of the study area, California's south coast counties, was concluded early in this investigation and during the past two years emphasis was placed on the application of specific management tools such as water development, predator control, artificial feeding, and the like. The results of some of these studies have already been published and at the close of the biennium the manuscript of a well illustrated handbook entitled "How to Increase Valley Quail in California" was nearing completion. This promises to be an important contribution to game management literature.

Arguments, pro and con, over a winter deer season in the south coast and southern regions of the State in 1943 and minor though nonetheless heated contentions over the proper season for taking antelope have emphasized the lack of technical knowledge of the condition of the meat of big game at various times of the year. As a result, a scientific study of deer and antelope meat, Project 15-R, was begun early in 1944. So far, the investigation has been confined to deer from the north coast, Marin County, and the south coast, Ventura and Santa Barbara Counties. The study is being conducted in cooperation with the Department of Home Economics of the University of California. The university is responsible for the analyses of the meat samples and the division for the collection of specimens and recording of field data. Samples of the stomach contents of all deer taken are being analyzed by the U. S. Fish and Wildlife Service.

#### **Development Projects**

The restoration of sagehen habitat in Lassen and Modoc Counties through the development of springs and the creation of fenced meadows, Project 1-D, was begun in 1940 and was terminated during the fall of 1942. Nineteen units were completed, some of them in cooperation with the Division of Grazing, the A. A. A., or private landowners who contributed money, labor, or materials.

Project 7-D, providing for resurveying and posting the boundaries of legislative game refuges, operated for almost a year before the shortage of personnel occasioned by the war made it necessary to suspend operations for the duration.

The construction of new levees and the improvement of old, together with the installation of spillways and gates on the Gray Lodge Waterfowl Refuge near Gridley was made possible by the approval of Project 13-D. Two hundred twelve thousand, four hundred and ninety cubic yards of earth were placed on  $12\frac{1}{2}$  miles of levee. Over 1,000 feet of concrete culvert of varying diameters, 18-inch to 36-inch, were placed and 135.43 cubic yards of concrete were used in the construction of headwalls.

The construction of a drift fence approximately five miles long on the western boundary of the Tehama Deer Winter Range, Project 14-D, was begun in the spring of 1944 and was still under way at the close of the biennium. The purpose of the fence is to control trespass by domestic livestock.

#### **Land Acquisition Projects**

Both Project 10-L, Tehama Deer Winter Range, and Project 11-L, Honey Lake Valley Waterfowl Management Area, were continued through the biennium. Twelve hundred acres were added to the Tehama Range and three parcels of land totaling 1,447 acres have been added to the Honey Lake area.

## **BUREAU OF GAME FARMS**

By AUGUST BADE, Chief

There are two very good reasons for the decline of 12 per cent in production and distribution of game birds for the biennium.

(1) Labor was not only scarce, but the quality of what was available was far below the level of ordinary years. In order to carry on in a comparable way to former seasons, women and high school students were employed as well as men well along in years.

(2) Early in 1942 it became apparent that the supply of protein would be cut about 50 per cent and that meant that all poultry and stock feeds would be affected. Since game birds are insect eaters their food, under domestic handling, must contain a high per cent of protein. With the lowering of the protein content of all commercial feeds, plus the inexperience of available help, the problem of producing game birds became involved.

### **USE OF MODERN EQUIPMENT**

The introduction of more modern equipment such as the battery brooder went a long way in compensating for the food and labor situation. For the past two years we had been working with the battery brooder in an effort to utilize this type of equipment in the production of game birds. The conditions imposed by the war, labor and food, helped to make the development of the battery brooder an actuality in the rearing of all upland game birds.

Not only does the battery brooder multiply labor, but it increases both production and the quality of the birds. And the use of the battery does not mean that we are discarding the former radiant type brooder that has been developed here in California and is now used by many States, but it does mean that the battery supplements the work of the older brooder and makes it even more efficient. With the introduction of the battery brooder all radiant type brooders now in use will be kept and their work merely increased and improved.

### **THE REARING PEN PROGRAM**

Even under war conditions the rearing pen program continues to meet with general approval and, while a few units quit for the duration other new units of pens were built and operated. At the beginning of the biennium we were serving 129 units and at the close that number had increased to 140. These cooperative efforts tend to increase interest in community affairs and lessen game law violations. The rearing pen program is educational as well as productive.

### **A TRAINING SCHOOL FOR GAME BREEDERS**

The two-year course in game management at Humboldt State College, Arcata, continues, but the armed services requirements of



manpower has reduced the number of students who are able to take advantage of this course. As a substitute classes have been organized at the Yountville farm for the training of new employees as well as the older men who are left on the job.

Classwork at the Yountville farm includes lectures supplemented by moving pictures and general discussion. These classes are held at night and are available to all employees and others interested in conservation.

#### **GAME MANAGEMENT AREA PROGRAM**

With four years of experience behind us the game management program continues for the man who can afford a longer shooting season and is willing to pay for the privilege. The commercial game breeder has been provided with a market for his product at a price that shows him a profit.

Field trials are now held on these areas where actual hunting conditions may be emulated for all types of hunting dogs. During the four years that game management has been practiced a total of 27,547 game birds have been released (and all these birds came from commercial breeders), while only 12,980 birds have been retaken, or less than 50 per cent. Game management has given to the unattached sportsman 14,567 birds that did not cost him a single penny. A check on territories adjacent to game managed areas shows a decided increase in game birds. In some instances banded birds that were released on game managed areas have been taken by hunters during the regular shooting season as far as 18 miles from the point of release.

#### **FIELD DOG TRIALS**

The sport of field trials has to some extent suffered by war restrictions and the number of trials held during a normal year has decreased, but in many cases clubs have functioned regardless of these handicaps. Some clubs have built their own pens for the rearing of birds for field trials. This is a good indication of the growth of this sport in California. There is also a decided increase in the use of hunting dogs, which is a real conservation measure.

#### **QUAIL TRAPPING PROGRAM**

As far as manpower and equipment is available the quail trapping program goes ahead and in another year or so we will know more about this sort of work and its place in the general scheme of more upland game.

#### **THE GENERAL PHEASANT SITUATION**

The 1943 season brought complaints from many hunters that pheasants were not as numerous as in previous years. Various reasons were advanced for this condition, especially in the Sacramento Valley areas. Some thought it was due to a poor hatching season. Others were sure it came about because too many male birds were taken. A few were of the opinion that the opening of the quail season in advance of the regular pheasant season had resulted in much illegal shooting.

During the spring and early part of 1944 regular checks have been made all over the Sacramento Valley and other areas where there have been a concentration of hunters the year before and there is a very definite decline in the number of birds.

	<i>Pheasants</i>	<i>Partridges</i>	<i>Quail</i>	<i>Turkeys</i>
Birds distributed -----	94,064	21,792	5,680	311
Birds hatched -----	100,306	25,500	7,503	637
Eggs laid -----	159,558	33,378	15,592	1,461
Eggs set -----	131,702	32,123	10,999	1,305
Eggs distributed -----	3,144	155	1,103	

## BUREAU OF PATROL AND LAW ENFORCEMENT

By L. F. CHAPPELL, Chief

The operations of the Bureau of Patrol during the past biennium were greatly curtailed due to the loss of manpower, rationing of gasoline and rubber incident to the war activities. This was to be expected. No replacement of mobile equipment was possible and no new tires have been available for our use since 1941. This has necessitated very careful handling of equipment and a great deal of credit is due to the personnel of the bureau in carrying on the work as well as they have under these circumstances.

In addition to the wardens and assistant wardens which were on military leave and which were reported in the last biennium, the following employees in the bureau have taken military leave of absence during this biennium:

### *Wardens*

Don Davison	5/ 4/44
Don Chipman	5/26/44
Harold Erwick	11/ 4/43
Owen Mello	9/14/44
H. S. Vary	5/17/43
Walter Greenwald	4/20/43
Larry Werder	3/ 4/43
Jay Cox	3/14/43
George Shockley	3/ 8/43
John Spicer	2/24/43
W. S. Talbott	1/29/43
A. L. Stager	1/ 1/43
John Hurley	12/ 7/42
Karl Lund	12/10/42
Walter Shannon	12/15/42
Leo Rossier	12/14/42
George Seymour	11/ 4/42
William La Marr	10/ 2/42
Chester Ramsey	10/20/42
John Barry	10/28/42
Carmi Savage	9/ 5/42
Garrie Heryford	9/28/42
Charles Towers	8/18/42
N. J. Millen	8/28/42
Howard Shebley	7/ 6/42

### *Captains*

L. J. Weseth	9/ 2/43
Ralph Classic	7/30/43

### *Assistant Wardens*

R. J. O'Brien	5/ 3/44
Robert Fraser	4/20/44
Frank Burns	4/11/44
Will Payne	3/31/44
Frank Felton	3/ 4/43
Glen Whitesell	10/30/42
Robert Hart	10/19/42
James Wade	9/12/42
Bolton Hall	9/30/42
Robert Kaneen	7/21/42
C. E. Whaley	7/17/42



*Deckhands*

Robert McDonald	3/ 9/43
Walter Scrimsher	11/ 1/42
Harry Peters	8/ 3/42

*Diesel Engineman*

Ralph Dale	10/20/42
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*Stenographer/Clerk*

Ruth Smith	11/ 8/43
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In addition to the above persons, the following members of the service resigned to enter other lines of work:

*Resignations**Wardens*

Ed Clements	1/25/44
E. L. Walker	3/14/44
R. J. Bullard	11/15/43
L. G. Van Vorhis	10/18/43
Kenneth Langford	4/29/43
Chester Parker	3/27/43
George Johnson	7/ 7/42
R. W. Remley	7/ 5/42

*Assistant Wardens*

Allen Swenson	8/ 2/42
---------------	---------

*Deckhand*

M. G. Stewart	9/29/43
---------------	---------

Ray O'Connor was placed on disability retirement in August of 1943 after 33 years of service with the division and E. A. Chan, former warden and later information clerk, went on disability retirement August 17, 1942 and passed away in April 1943.

Our ranks were further reduced by the deaths of the following wardens which occurred during the biennium:

*Deaths*

Alvin Granstrom	7/21/43
Charles Love	8/11/43
C. L. Bundock	6/ 5/43
A. R. Ainsworth	8/ 8/42

The patrol boat "Sturgeon" based at Monterey, and the patrol boats "Perch" and "Quinnatt III" based in the San Francisco Bay District were requisitioned by the United States Coast Guard in September, 1942. This equipment was sold outright to the War Shipping Administration after rather lengthy negotiations.

The patrol boats "Tuna," "Yellowtail" and "Broadbill" were chartered to the Coast Guard in August of 1942. Under the terms of this charter, we expect this equipment to be returned.

The only remaining patrol boat, the "Bonito" is operating in southern California waters.

To supplement the marine patrol in the bay area a 19-foot open launch was purchased in February of 1943, this boat being of shallow draft, makes it possible to cover more of the restricted waters in the bay area.

With the completion of the Shasta Dam and the storage of water at that point, it became evident that some method of patrol on this lake would be necessary as it opened up a great virgin country which heretofore had been inaccessible as there were very few trails and no roads leading into it. Accordingly the commission approved the purchase of a small launch for use on this reservoir. The purchase was completed in June of 1944.

A boat has been chartered for patrol work in Monterey Bay after it became evident that a more intensive coverage of these waters would be necessary.

Airplanes were used to some extent in northern California where military restrictions did not prevent their operation. During the hunting seasons for antelope and deer in Modoc and Lassen Counties, planes were used to a great extent and with very satisfactory results. This equipment will be a necessary and important part of the patrol activity after the war.

A summary and recapitulation of arrests and convictions will be found in the appendix on page 75.

## REPORT OF THE BUREAU OF MARINE FISHERIES

By RICHARD VAN CLEVE, Chief

Total landings of fish, in pounds, for the State of California for the years 1942 and 1943 are shown in Table I, with the production of canned fish, fish meal and fish oil.

TABLE I

	1942	1943	Total
Total landings, pounds-----	1,171,514,793	1,229,754,615	2,401,269,408
Cases of canned fish-----	6,941,643	6,698,134	13,639,777
Tons of fish meal produced-----	79,003	86,151	165,154
Gallons of fish oil produced-----	12,686,640	14,016,179	26,702,819
Value of canned and processed fishery products -----	\$67,432,689	\$70,496,100	\$137,928,789

The total landings in these two years were 416,172,000 pounds behind the landings in the previous biennium, but the total value of the fishery products produced was the highest ever recorded for this State. Shortage of labor resulted in a decrease of 29 per cent in the production of canned fish.

The value of the principal species of fish to the fishermen in the two years is shown in Table II.

TABLE II

Pounds and Value of Commercial Fish Landings in California—1942-43

Species	1942*		1943	
	Pounds	Value	Pounds	Value
Sardine -----	969,747,099	\$10,369,736	972,249,015	\$10,781,440
Yellowfin tuna -----	41,466,614	3,823,857	49,261,328	4,880,540
Skipjack -----	38,735,228	3,334,608	28,893,784	2,582,850
Albacore -----	11,091,699	2,107,209	21,384,864	3,477,417
Bluefin tuna -----	12,844,564	1,158,514	10,178,768	967,562
Shark -----	3,468,290	1,150,497	3,729,246	1,933,173
Pacific mackerel -----	52,553,663	954,643	75,262,739	1,492,918
Salmon -----	6,616,216	827,403	6,581,076	1,227,624
Barracuda -----	3,454,537	332,757	3,775,278	656,372
Crab -----	2,414,086	282,778	2,315,338	353,287
Sole -----	3,155,757	228,635	4,782,379	265,203
Yellowtail -----	2,726,269	192,631	4,934,879	368,724
Spiny lobster -----	856,300	150,037	985,525	256,153
Sablefish -----	1,972,270	129,974	3,206,074	267,671
Bonita tuna -----	1,650,689	126,732	2,282,299	181,354
Rockfish -----	1,423,290	104,172	2,762,192	185,541
California halibut -----	756,065	102,422	1,121,673	238,670
Horse mackerel -----	5,348,501	101,606	12,698,974	235,878
Broadbill swordfish -----	445,908	94,217	336,386	102,430
Shad -----	2,571,633	84,459	2,348,143	114,648
White sea bass -----	553,726	78,995	500,183	122,797
Black sea bass -----	378,780	46,808	700,855	157,298
All others -----	8,291,042	427,356	19,489,950	1,101,219
Totals -----	1,172,522,226	\$26,210,046	1,229,780,948	\$31,950,769

\* Landings for 1942 include shipments to canneries from other States and foreign countries to the value of \$106,778.

The catch of fish sold in the fresh state was 30,092,000 pounds in 1942, and 37,683,000 pounds in 1943. The increase in 1943 occurred among a number of species, and probably reflects the adjustment of the industry to war conditions. Some of the fishing grounds which were closed in 1942 for defense purposes have again been opened. War emergency restrictions on the movements of boats into and out of ports have been somewhat relaxed, and readjustments in price ceilings have encouraged fishermen to again seek species which were formerly priced so low that it was unprofitable to bring them to port.

One of the most interesting developments of the biennium was the heavy catch of albacore during 1943. The catch of this species for this year was the highest recorded since 1925. The albacore fishery developed gradually after the last World War, along the California coast until in 1925 a catch of 22,206,923 pounds was landed. In 1926 the albacore catch fell to 2,469,385 pounds and did not again reach the 1925 figure until 1943. The catch in California is, now, only a part of the total present production of albacore on the coast, since a considerable fishery has developed off the coasts of Oregon and Washington in the last ten years.

#### COMMERCIAL FISHING LICENSES

The record of licensed commercial fishermen in California for the biennium, is shown in Table III.

TABLE III  
Licensed Commercial Fishermen

<i>Nativity</i>	<i>1942-43 licensed fishermen</i>	<i>1943-44 licensed fishermen</i>
United States -----	5,346	7,893
Italy -----	1,197	1,374
Jugoslavia -----	940	909
Norway -----	461	360
Portugal -----	328	341
Great Britain -----	187	239
Sweden -----	85	94
Mexico -----	68	62
Spain -----	57	59
Denmark -----	45	61
Finland -----	45	56
Russia -----	45	64
Greece -----	44	51
Germany -----	34	55
Austria -----	29	--
France -----	21	23
Netherlands -----	--	28
All others -----	111	134
Total -----	9,043	11,803

It is of interest to note that while the number of fishermen dropped in the 1942-43 season, from the previous season, the number of commercial fishing licenses sold in the 1943-44 season was the largest ever recorded for this State. The decrease in 1942-43 was due in part to the loss of the Japanese fishermen who were barred from operations off the coast. These were only partially replaced by the other nationalities.

Interest in the lucrative albacore and soupfin shark fisheries, which were successful in 1943, as well as high prices of all fish, encouraged large numbers of people to enter the industry. However, commercial licenses were also bought by some solely to qualify for the Coast Guard passes required for movement of boats in ocean waters. An unknown number of licenses must be classified as temporary, and do not represent a permanent increase in the number of commercial fishermen in the State.

Some idea of the distribution of the increase within the State may be obtained from Table IV which shows the number of commercial fishermen registering as residents of the different ports.

TABLE IV

<i>Region of Residence</i>	<i>1942-43</i>	<i>1943-44</i>
Eureka -----	213	315
Sacramento -----	367	442
San Francisco -----	927	1,347
Monterey -----	994	968
Santa Barbara -----	306	276
Los Angeles -----	4,379	6,536
San Diego -----	1,391	1,552
Alaska, Washington, and Oregon -----	466	354
Mexico -----	—	13
Total -----	9,043	11,803

## SARDINES

The catch of sardines is reported on a seasonal basis, the season in northern California extending from August 1st to February 15th, and that in southern California from October 1st to March 1st. The details of the production are given in the catch circulars which are reprinted in the appendix. The total production of sardines and sardine products is shown in Table V for the two seasons of the biennium.

TABLE V

<i>Sardines (seasonal record)</i>	<i>1942-43</i>	<i>1943-44</i>
Total tons landed -----	501,341	473,522
Tons received for canning -----	271,703	231,527
Total cases of all size cans packed -----	3,743,373	3,160,701
Number of reduction permits issued -----	76	75
Permit tonnage granted -----	378,634	370,272
Number of tons used under permit -----	229,334	241,733
Tons of sardine meal produced -----	76,983	73,512
Gallons of sardine oil produced -----	13,148,783	13,783,011

A further increase in the number of reduction permits over the previous biennium is noted. Furthermore, a decrease in the total case pack from the record established in the 1941-42 season also occurred. The catch in both years was below that of 1941-42. During the 1941-42 season, an overall average of 9.2 cases of sardines were packed for every ton of sardines landed. In the 1942-43 season this case pack had fallen to 7.5 per ton; and decreased still further in 1943-44 to 6.7 cases per ton. While the decrease in catch of the last year of the biennium amounted to 5.5 per cent over the first year of the biennium, only 49 per cent of the last year's catch was received for canning, whereas 54 per cent of the first year's catch was received for this purpose. The decrease in pack was due not only to the decrease in catch. There is no doubt that the high prices



of meal and oil, as well as the shortage of cannery labor, also contributed to the diversion of a greater proportion of the fish into the reduction plants.

#### Allocation

The decrease in the canned pack of the last year of the biennium occurred in spite of the complete regulation of the fishing and utilization of sardines by the Federal Government under the so-called "allocation orders."

After the beginning of hostilities, and with the beginning of the 1942-43 season, it was apparent that some outside agency would have to enter the sardine picture in order to prevent a major loss in production. The sardine fishing fleet had been reduced in size by the loss of large numbers of the sardine boats to the Army and the Navy. Those plants owning boats naturally desiring to ensure their own catch prevented the sale of the catch of their boats to other plants and in other ports. As a result some plants at times had an excess of fish, most of which was diverted to reduction while other cannerys were unable to obtain enough fish to operate their plants. During periods of heavy fishing the boat loads were limited by the plants to keep the landings within the owner's production capacity.

An attempt was made by the California Division of Fish and Game to remedy this situation; and the first order of the commission was issued on August 22, 1942, to prevent the loss of boat production by imposition of catch limits and to distribute the fishing fleet between the three California sardine ports in proportion to their plant capacities. Several months were required to solve the numerous problems involved in the inauguration of such a radical departure from normal fishing operations; and the commission was unable to put allocation into operation before injunction proceedings, instituted by several sardine plant operators in the port of Monterey, forced the cessation of allocation activities. Allocation was then taken over by the War Production Board which had cooperated closely with the commission in its early attempts to organize the allocation program. The War Production Board carried through allocation to the end of the 1942-43 season.

During the period between the end of that season and the beginning of the 1943-44 season, the office of the Coordinator of Fisheries was established in the Department of the Interior within the personnel of the U. S. Fish and Wildlife Service. This organization took over allocation at the beginning of the 1943-44 season. The imposition of limits on the boat catches was prohibited. Boats were licensed to fish in certain ports in an attempt to distribute an inadequate fleet equitably between the three fishing ports in California, to obtain the greatest possible production from them. Poor fishing experienced in the ports of Monterey and San Francisco during the months of October, November, and December, however, made it impossible to maintain the distribution of boats on an equitable basis and the canned pack fell to the lowest figure reached in the last three years.

#### Sardine Investigations

Although sardine investigations have been curtailed due to lack of personnel, the essential phases are being continued. During each season the daily catch has been sampled so that there will be no break in the

continuity of studies of size changes of fish. The age analysis of the catch has been carried on through a cooperative study with the U. S. Fish and Wildlife Service. No sardines were tagged during this biennium, but tags were recovered from former releases. In the 1942-43 season, 1,328 tags were recovered in the California fishery, and eight in the Pacific northwest. In 1943-44, 648 tags were returned in California, and 52 in the Pacific northwest. These represent recoveries from groups released in previous years off the coast of Mexico, Southern California, Monterey and San Francisco. In addition, 78 recoveries were made in California of tags released off the mouth of the Columbia River by the Oregon Fish Commission, and three were taken which had been released by the Fisheries Research Board of Canada off the Washington coast.

Analyses have been continued of the fisherman's catch per unit of effort expended. These studies, together with the age readings and length measurements, indicate that at present the sardine population is in a comparatively healthy condition due to good spawning survival in 1937 and 1939. These two year-classes have been the main support of the fishery for the past three or four seasons.

Annual meetings with representatives of fisheries departments of Canada, Washington, Oregon, California, and the U. S. Fish and Wildlife Service have been held to coordinate the sardine investigations of the fisheries staffs of Canada, and the Pacific Coast States.

#### TUNA

The landings in pounds of tuna at California ports for the years 1940 through 1943 are as follows:

TABLE VI

	1940	1941	1942	1943
Albacore -----	3,885,000	2,747,000	10,621,000	21,385,000
Bonito -----	5,291,000	10,177,000	1,651,000	2,282,000
Bluefin -----	19,970,000	9,519,000	12,845,000	10,179,000
Skipjack -----	56,650,000	25,585,000	38,715,000	28,894,000
Yellowfin -----	113,760,000	76,702,000	41,167,000	49,261,000
Total -----	199,556,000	124,730,000	104,999,000	112,001,000

#### MACKEREL

The catch of mackerel in 1942 was 52,353,663 pounds. In 1943 it rose to 75,261,000 pounds. A shortage of fish in 1942 added to the difficulties of movement of the boats in and out of the harbors in Southern California, resulted in the lowest mackerel catch that has been recorded in 10 years. The canning season, which is determined only by the availability of fish, began in September, 1942; and extended for that season only to March, 1943. The latter part of this season was characterized by the presence of large numbers of fish which were too small for the canners to handle properly. In 1943-44 the return in large numbers of the 1942 yearlings resulted in a major increase in the catch. As two-year olds, these fish were satisfactory for canning. The 1943-44 season started in August, and ended in February.

### Mackerel Investigations

The loss of the staff working on Central Valleys and salmon investigations required another shift in the personnel. It has been necessary to suspend most of the mackerel investigations and to shift that personnel to the salmon work. Sampling of the mackerel catch has been maintained at San Pedro and at Newport.

Mackerel tagging was greatly reduced. From November, 1942, to March, 1943, 2,474 fish were tagged at Catalina, 1,361 at Newport, and 2,536 in Santa Monica Bay.

The numbers of mackerel tags recovered from different sections of the coast during the biennium are shown in the table below.

TABLE VII

<i>Released</i>	<i>1942-43</i> <i>Recovered</i>		<i>1943-44</i> <i>Recovered</i>	
	<i>Central</i> <i>Calif.</i>	<i>Southern</i> <i>Calif.</i>	<i>Central</i> <i>Calif.</i>	<i>Southern</i> <i>Calif.</i>
Oregon -----	—	—	—	1
Central California * -----	5	23	—	5
Southern California † -----	10	399	29	237
Mexico ‡ -----	3	75	5	28
Total -----	18	497	34	271

\* Monterey to San Francisco

† Santa Barbara to San Diego

‡ West Coast Lower California

### CENTRAL VALLEYS AND SALMON INVESTIGATIONS

#### Tagging

Salmon tagging with numbered celluloid button tags fastened below the dorsal fin was started off the coast of California in 1939 and was carried through the fall of 1942. A total of 1,765 fish were tagged from chartered trolling boats in 1942. Sufficient personnel was not available to expand the effort required to obtain quantitatively significant returns. Only 143 tags were recovered in 1942, and 31 in 1943. Salmon have been retaken that have borne their tags for three years.

#### Migrant Counts

Counts of the adult salmon were made in 1942 on the following streams: Trinity River at Hoopa, American River at Folsom Dam, as well as at a rack established near Sacramento, the Tuolumne River at Modesto, and on the Mokelumne River at Woodbridge Dam. Estimates of numbers spawning in the San Joaquin River were made by surveys of the spawning areas below Friant Dam.

The 1942 estimates and counts made on these rivers are as follows:

Tuolumne River -----	44,494
American River (Folsom) -----	1,888
Mokelumne River (Woodbridge) -----	12,119
Trinity River -----	1,137
San Joaquin (approximate) -----	6,000

None of these counts except that on the Tuolumne are considered to be accurate. The count on the Trinity depended upon the installation of a weir by the Indians at the Hoopa Indian Reservation. The weir was not installed until late in the year; and it washed out with the first large freshet. No estimate of the run that passed this point, either before or after the weir was in place, was obtained.

In 1943 no one was available to make a count on the Tuolumne River. An estimate of the number of fish that ran up the San Joaquin River and spawned below Friant was again made. Approximately 7,000 fish were counted on the spawning beds in this area. From similar counts made in other streams where check counts at weirs were available indicate that this must be considered a minimum estimate of the numbers of fish present in the upper San Joaquin.

A trap was installed on the American River below the spawning grounds and the run in that stream was estimated by tagging fish at this trap and later comparing proportions of tagged and untagged fish on the spawning beds. Heavy spring and fall freshets preclude the possibility of obtaining complete counts of migrants remaining below Folsom Dam. The 1943 run was estimated to total 7,000 fish by this method.

#### **Fyke Net Work**

Fyke nets were operated to determine the numbers of salmon fry lost in various diversion canals. Nets were also run in the rivers near the intake of those canals tested to check the time and size of the downstream migration.

From May 1st to June 9, 1943, nets were operated in the Sacramento River (near Chico), the Glenn-Colusa Canal, the Feather River (near Oroville), the Sutter-Butte Canal, and the Great Western Canal. The movement of young salmon was evidently early, and most of them had moved out of the rivers by the time the ditches began taking water. Results obtained can not therefore be considered significant.

In 1944 the work was started earlier with an earlier start of the irrigation season. On the Feather River (near Gridley) nets were operated from January 23d to May 31st. The heaviest downstream movement of young salmon occurred during March and April. The Sutter-Butte Canal opened early in April and moderate numbers of salmon were taken in the canal between mid-April and the end of May. The Great Western Canal opened in mid-April and took very few salmon. These catches were again affected by variations in stream flow and the difficulty of operating fyke nets in irrigation canals. They must be repeated to determine the significance of the results obtained. Both of these canals divert water from the Feather River.

On the San Joaquin River near Mendota the fyke nets were operated from January 19th to July 16th. Four large canals and one small one leave the river at this point. At least one canal diverts water at all times. By March 7th of 1944 all canals were operating.

The migration of young salmon down the San Joaquin was heavy from January 27th through March, and reached its peak on February 24th. The canals diverting water at Mendota did no appreciable damage until February 11th, but from that time on the loss of young salmon was heavy. On February 18th one fyke net took 3,000 young salmon from one canal.

#### **Shasta Salvage Operations**

In November of 1942 the fall run of adult salmon was blocked for the first time at Shasta Dam when construction reached the point where it was no longer possible to take the fish over. From that time on the salvage program of the U. S. Bureau of Reclamation was in full operation.



The salmon run reaching the vicinity of the Shasta Dam after November, 1942, was forced to spawn in the river below this point. The entire fall run in 1943 spawned in the river below Keswick and the spring runs of 1943 and 1944 were transferred into Deer Creek and Battle Creek. It is too early as yet to determine how successful the salmon maintenance program below Shasta is. This will only become evident when fish that have been produced by the runs blocked by Shasta Dam and have been handled by the salmon maintenance program operated by the U. S. Fish and Wildlife Service for the Bureau of Reclamation, return again to the fishery and to the river areas in which they were produced. The first effects of the salvage operation should become evident in the fall of 1946; and the full effect of the salvage operations on the fall run will be felt in 1947.

### SOUPFIN SHARK

The decrease in the production of soupfin shark, noted in the previous biennium, continued during the present biennium. Total landings for 1942 and 1943 were 3,468,290 and 3,722,729 respectively. This decline in landings occurred in spite of an increased fishing effort and the greater efficiency of the various types of nets used. The effort required to catch one shark has increased 27 times from 1942 to 1944.

An investigation of the Vitamin A potency of the soupfin shark and its relationship to the biology of the species was continued. From July 1, 1942, to July 1, 1944, samples of 461 livers were collected and analyzed at Stanford University. During 1943 the fishery was observed; and samples of the catch were obtained along the entire coast of California. Data obtained is being analyzed, and a report is being prepared for publication.

The observations of the catch have indicated that in Southern California the fisherman's catch is composed almost entirely of female soupfin. In contrast to this, male soupfin appear to be concentrated in the northern waters of the State. It has been established that the vitamin potency of the soupfin shark increased with size, and in the female definite relationship of Vitamin A potency to the state of sexual maturity, as well as the sexual development of the individual, has been found. In both males and females immature individuals exhibit very low vitamin potencies and their total value in terms of Vitamin A is small. On attaining maturity, however, the vitamin potency increased rapidly with size. This change from low potency to high potency livers begins in males at a total length of about 155 centimeters, and in females at a total length of about 165 centimeters.

### OYSTERS

After some years of trying to cultivate native oysters (*Ostrea lurida*), in Humboldt Bay, it has been finally demonstrated that it is impractical. Following the closure of the last company attempting this, the commission rescinded its previous regulations closing the bay to the introduction of Pacific oysters (*Ostrea gigas*). The bureau is planning to make some experimental plants of this large Pacific oyster to determine the possibility of inducing it to reproduce in this area.

Oyster cultivation was carried on successfully, especially at Morro Bay; but within the last year operations of the Army Engineers in



dredging channels through the bay indicate that it may be difficult to continue to maintain these beds unless these plans are held within the bounds of reason.

#### ABALONES

Early in the biennium most of the abalone divers had moved from Monterey to Southern California, south of Point Conception, where they worked on the collection of agar weed, or *Gelidium*. After this southern coast was opened to abalone diving by the 1943 Legislature, they fished for green abalones. The small size of this species and increasing difficulties in gathering *Gelidium* made the venture unprofitable. By the end of the biennium most of the divers had moved back to Morro Bay. The two years' rest given to the abalone beds in District 18 while the divers were in Southern California has resulted in a plentiful supply of large abalones.

#### STATISTICS

Continued shortage of personnel has required a modification of operations in the statistical system. Insofar as possible, the collection of basic material has been continued, although difficulty has been experienced in obtaining an adequate field check to maintain the accuracy of the records. The inadequate clerical help has made it necessary to drop most of the special analyses that were heretofore published annually. The basic records, however, have for the most part been obtained; and these analyses can be brought up to date as soon as the employment situation recovers.

## REPORT OF THE BUREAU OF ENGINEERING

By JOHN SPENCER, Chief

The activities of the bureau were, as in other lines, curtailed by the war. Routine inspections and investigations were carried on and consideration was also given to the future operations when more nearly normal conditions will prevail.

Investigations and some construction were carried on where it was permitted by the Federal agencies. The major portion of this activity was for the Bureau of Game Conservation in connection with their administration of the Pittman-Robertson Projects. When what appears to be suitable projects are found, a preliminary survey is made, and the data thus obtained determines its possible benefits to game. Six surveys of this kind were made, the data worked up and submitted to the Bureau of Game Conservation. In time some of these will probably receive further consideration.

The Tehama Winter Deer Refuge in Tehama County, comprising 25,000 acres, was surveyed, specifications were issued for fencing the exterior boundaries, and the contract was awarded. The work, however, has been under the supervision of the Bureau of Game Conservation.

About 10 miles west of Gridley is the commission's Gray Lodge Waterfowl Refuge of 2540 acres. This refuge did have a system of levees but these were improved and made more effective, and substantial water control facilities and improvements were added. The levees, which are of sufficient width for vehicle travel, required the placing of 212,000 cubic yards of material and totaled  $12\frac{1}{2}$  miles in length. Some further work is to be done when present war restrictions will permit.

Several projects are under consideration in Lassen County. One purchase of 2,200 acres has been made for waterfowl purposes and surveys are now in progress, and the intent is to proceed with the needed and extensive improvements in 1945 if it is permitted under the war regulations.

The bureau has not had the proper facilities for storing its construction equipment and supplies. When material for construction is available it is expected to provide these facilities on land that has been purchased in the City of Redding as that place will be equipment headquarters for central and northern sections of the State.

The regular inspection of fish screens, previously installed, has continued, the 1,500 inspections made have well demonstrated that fish screens, as designed and installed, do stop the fish from entering the water diversions and subsequently being destroyed, and at the same time the continued flow of water is not stopped or interfered with. No new fish screens have been installed.

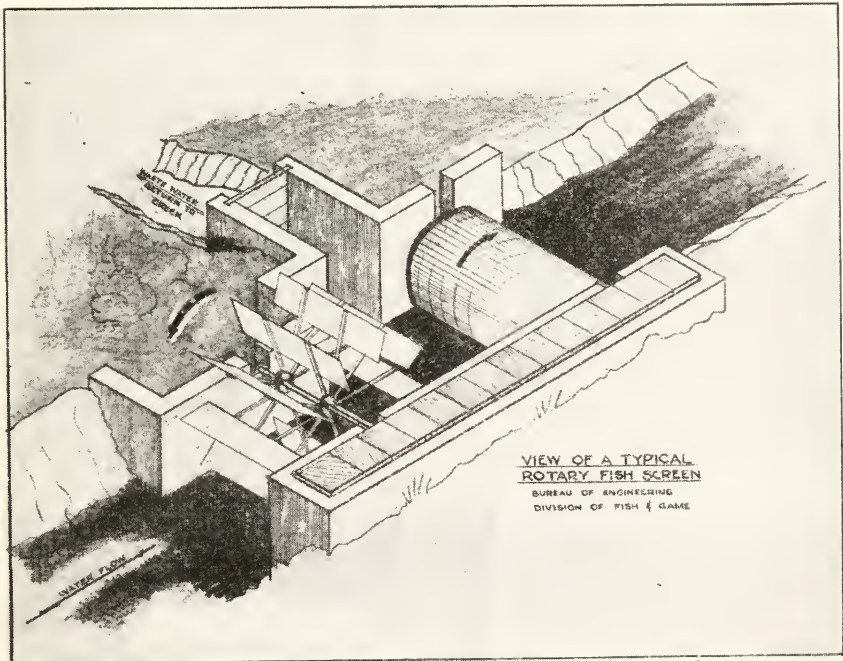
Four new fishways over or around dams have been constructed by the owners of these dams. These installations were made due to commitments made by the owners to the writer in the preceding biennium. Over 250 inspections of dams and existing fishways were made to see if improvements or repairs were required. Twelve fish ladders were

repaired. The bureau has recommended to the executive secretary the installation of a number of fishways or their repair.

Special matters requiring investigations numbered 104, while 160 maps or plans were prepared.

In the spring of 1941, the greater portion of the responsibility for the work in connection with fish screens and fish ladders was placed in other bureaus, and the obligations and responsibilities of the Chief of the Bureau of Engineering were not definitely defined and hence no further report on these subjects is made.

The subject of fish screens, and to a somewhat lesser degree that of fish ladders, has been before the commission for many years. Some progress has been made though the rate is far from satisfactory. It does not appear that there is sufficient knowledge of the need for protecting fish from the water diversions of the State by the ones who should be interested in this subject and this apparent lack benefits those who are opposed to an active and definite program with respect to these two matters. The problem of fish protection is probably more acute in this State than in some other States due to limited rainfall in certain areas and the numerous and large diversions of water made for agricultural, industrial, domestic and power purposes.



A number of agencies diverting water, and others, profess to believe that the problem has no solution, and appear to be of the belief that some one fish screen, yet to be found, is necessary before the great loss of fish through these unprotected water diversions can be stopped. The fact that this commission has had installed a number of successful

fish screens of different types for varying conditions is carefully ignored. The need is not for some visionary and undemonstrated fish screen but rather the application of the knowledge at hand and which has been available for some years.

It should be kept in mind that fish screens and fish ladders concern themselves with water, a vital need in the State of California. A policy of dealing with the diverters of water and the owners of dams should be determined based on a broad understanding of the needs of these parties as well as a reasonable application of fish protection measures, looking toward cooperation with those with whom the commission must deal in the application of the Fish and Game Code in these subjects.

In order that a defined policy be effective and reasonable in its operation, it appears that the responsibility should be fixed in one person. Several people can not be engaged in this work and have it carried out in an orderly and economical manner.

The subject of fish screens and fish ladders is a most important one in conservation work and it is recommended that conservationists give this subject their earnest and active consideration.

## REPORT OF THE BUREAU OF LICENSES

By H. R. DUNBAR, Chief

The biennium from July 1, 1942, to June 30, 1944, has presented many problems in the distribution and sale of licenses. Due to the various wartime restrictions, license sales have decreased and we have lost many of our license agencies as they were unable to obtain merchandise, or the lack of help caused them to discontinue handling licenses for the duration.

In past years, it has been difficult to maintain proper distribution of licenses in the northern counties of the State and at times the sportsmen found it difficult to purchase their licenses. In July of 1942, an office was established at Redding. This office served all cash agents in Trinity, Siskiyou, Shasta, Tehama, Modoc, and Lassen Counties. The office also serves as headquarters for the Patrol captain for the same territory.

In the distribution and sale of our licenses and tags, the license agents who conduct sporting goods, hardware, and various types of businesses, play an important part in assisting the division in making it possible for the sportsmen to obtain their licenses throughout the State. To simplify the work of the agents, the style of the license book was changed by eliminating the separate application form and incorporating it with the license stub. This has saved the agents considerable time and work, and they are well pleased with the change.

For various reasons as a result of the war, our license sales have decreased from the sale in 1941. Gasoline rationing and areas closed to hunting have been important factors in the decrease in sales. During the 1942 deer hunting season, all of Southern California and coastal areas were closed to hunting except the area north of San Francisco, which area was opened from August 1st to August 21st. In 1942, the deer tag sale dropped from a total of \$173,699 in 1941 to \$116,121. Hunting licenses dropped from \$643,700 in 1941 to \$522,985 in 1942. During the 1943 deer hunting season, the same areas were closed as in 1942 although in the month of December hunting was permitted in Southern California and the coastal area south of San Francisco. This resulted in an increase in deer tag sales from \$116,121 in 1942 to \$147,755 in 1943.

During the 1943 Session of the Legislature, a law was approved providing for a pheasant tag costing \$1. Due to priorities and other causes, it was not possible to obtain a suitable type of tag. A cardboard tag, similar to the deer tag, was finally adopted. Approximately \$121,000 in tags were sold.

The annual antelope drawing, as provided by Section 1346, was held at Sacramento on August 13, 1943. In all, 3,653 persons made application. Of the first 500 applicants who were entitled to a permit, 379 made application and were issued a permit. The 500th or last permit was issued to the applicant whose drawing number was 716.

The commission, in compliance with Section 1347, provided for an elk season in Inyo County in the fall of 1943. A drawing similar to that held for antelope was held at the Fish and Game office at Los Angeles on November 8, 1943. There were 2,837 applications received. Permits were issued to the 75 applicants who qualified at the drawing.



## FINAL STATEMENT OF ANGLING LICENSE SALES, 1942 SERIES

County	Citizen, \$2 each	Non-resident, \$3 each	Alien \$5 each	Duplicate, 50c each	Total
Alameda.....	\$65,730 00	\$48 00	\$575 00	\$39 00	\$66,392 00
Alpine.....	328 00	183 00			511 00
Amador.....	1,678 00	6 00	5 00	2 00	1,691 00
Butte.....	9,662 00	39 00		13 00	9,714 00
Calaveras.....	1,862 00			3 00	1,865 00
Colusa.....	1,432 00		10 00	1 00	1,443 00
Contra Costa.....	21,232 00	48 00	205 00	18 00	21,503 00
Del Norte.....	3,194 00	258 00	5 00	10 00	3,467 00
El Dorado.....	4,696 00	144 00	10 00	5 00	4,855 00
Fresno:					
Agents.....	22,554 00	3 00	45 00	7 00	22,609 00
Fresno Branch.....	516 00	30 00	230 00	18 50	794 50
Totals, Fresno.....	\$23,070 00	\$33 00	\$275 00	\$25 50	\$23,403 50
Glenn.....	1,082 00	6 00	5 00	2 00	1,095 00
Humboldt.....	12,606 00	87 00	115 00	28 00	12,836 00
Imperial.....	2,752 00	3 00		3 50	2,758 50
Inyo.....	12,256 00	171 00	70 00	21 50	12,518 50
Kern.....	11,252 00	6 00	5 00	4 00	11,267 00
Kings.....	2,902 00		30 00	1 50	2,933 50
Lake.....	3,500 00	9 00	5 00	5 50	3,519 50
Lassen.....	4,644 00	54 00	25 00	3 50	4,726 50
Los Angeles:					
Agents.....	202,588 00	174 00	160 00	76 50	202,998 50
Los Angeles Branch.....	564 00	120 00	620 00	75 50	1,379 50
Terminal Island Branch.....	86 00	6 00	55 00	9 00	156 00
Totals, Los Angeles.....	\$203,238 00	\$300 00	\$835 00	\$161 00	\$204,534 00
Madera.....	3,892 00	9 00	5 00	6 00	3,912 00
Marin.....	10,094 00	3 00	100 00	7 00	10,204 00
Mariposa.....	4,506 00	114 00		15 00	4,635 00
Mendocino.....	8,484 00	9 00	5 00	2 00	8,500 00
Merced.....	4,718 00	9 00	30 00	10 00	4,767 00
Modoc.....	2,826 00	153 00		2 50	2,981 50
Mono.....	7,242 00	486 00	5 00	26 00	7,759 00
Monterey:					
Agents.....	8,902 00	9 00	310 00	13 50	9,234 50
Monterey Branch.....			75 00		75 00
Totals, Monterey.....	\$8,902 00	\$9 00	\$385 00	\$13 50	\$9,309 50
Napa.....	9,040 00	15 00	30 00	9 00	9,094 00
Nevada.....	5,972 00	504 00	35 00	21 00	6,532 00
Orange.....	20,114 00	24 00		3 00	20,141 00
Placer.....	6,218 00	90 00	10 00	5 00	6,323 00
Plumas.....	7,440 00	123 00	65 00	23 50	7,661 50
Riverside.....	11,396 00	12 00	10 00	8 00	11,426 00
Sacramento:					
Agents.....	27,408 00		335 00	7 50	27,750 50
Sacramento Branch.....	454 00	102 00	1,320 00	64 00	1,940 00
Totals, Sacramento.....	\$27,862 00	\$102 00	\$1,655 00	\$71 50	\$29,690 50
San Benito.....	1,032 00		10 00	3 00	1,045 00
San Bernardino.....	32,546 00	129 00	45 00	26 00	32,746 00
San Diego:					
Agents.....	52,614 00	201 00	5 00	1 50	52,821 50
San Diego Branch.....	92 00	81 00	80 00	12 00	265 00
Totals, San Diego.....	\$52,706 00	\$282 00	\$85 00	\$13 50	\$53,086 50
San Francisco:					
Agents.....	58,166 00	12 00	530 00	22 50	58,730 50
San Francisco Branch.....	592 00	126 00	2,375 00	110 50	3,203 50
Totals, San Francisco.....	\$58,758 00	\$138 00	\$2,905 00	\$133 00	\$61,934 00
San Joaquin.....	21,328 00	12 00	15 00	14 00	21,369 00
San Luis Obispo.....	9,078 00	3 00	10 00	17 50	9,108 50
San Mateo.....	9,254 00		45 00	8 50	9,307 50
Santa Barbara.....	7,552 00	6 00	20 00	13 50	7,591 50
Santa Clara.....	18,454 00	15 00	75 00	19 50	18,563 50
Santa Cruz.....	7,876 00	12 00	185 00	14 00	8,087 00
Shasta:					
Agents.....	11,744 00	63 00	15 00	30 00	11,852 00
Redding Branch.....	20 00	9 00	5 00	4 00	38 00
Totals, Shasta.....	\$11,764 00	\$72 00	\$20 00	\$34 00	\$11,890 00

## FINAL STATEMENT OF ANGLING LICENSE SALES, 1942 SERIES—Continued

County	Citizen, \$2 each	Non-resident, \$3 each	Alien, \$5 each	Duplicate, 50c each	Total
Sierra.....	\$1,394 00	\$15 00		\$2 00	\$1,411 00
Siskiyou.....	9,358 00	369 00		9 50	9,761 50
Solano.....	21,914 00	12 00	\$25 00	58 00	22,294 00
Sonoma.....	17,872 00	18 00	310 00	22 00	18,072 00
Stanislaus.....	11,954 00	24 00	160 00	18 00	12,056 00
Sutter.....	2,518 00			7 50	2,525 50
Tehama.....	2,940 00	6 00		5 50	2,951 50
Trinity.....	1,384 00	6 00	5 00	2 50	1,397 50
Tulare.....	11,316 00	27 00	35 00	9 50	11,387 50
Tuolumne.....	3,784 00		5 00	7 50	3,796 50
Ventura.....	7,092 00			4 50	7,096 50
Yolo.....	2,820 00			2 00	2,822 00
Yuba.....	6,242 00	36 00	30 00	7 00	6,315 00
Out of State:					
Arizona.....	568 00	228 00			796 00
Nevada.....		4,392 00		50	4,392 50
Oregon.....	142 00	99 00			241 00
Totals.....	\$857,468 00	\$8,958 00	\$8,555 00	\$1,022 50	\$876,003 50
Number.....	428,734	2,986	1,711	2,045	

## FINAL STATEMENT OF MARKET FISHERMAN LICENSE SALES, 1942 SERIES

County	Licenses \$10 each	Total
Contra Costa.....		\$1,200 00
Del Norte.....		210 00
Humboldt.....		2,240 00
Los Angeles—Terminal Island Branch.....		47,590 00
Mendocino.....		1,000 00
Monterey Branch.....		11,110 00
Sacramento Branch.....		1,350 00
San Diego Branch.....		13,960 00
San Francisco Branch.....		12,000 00
Santa Cruz.....		790 00
Sonoma.....		270 00
Total.....		\$91,720 00
Number.....		9,172

## FINAL STATEMENT OF ANGLING LICENSE SALES, 1943 SERIES

County	Citizen, \$2 each	Non-resident, \$3 each	Alien, \$5 each	Duplicate, 50c each	Total
Alameda.....	\$68,956 00	\$45 00	\$800 00	\$14 50	\$69,845 50
Alpine.....	260 00	204 00			464 00
Amador.....	1,714 00	3 00		2 50	1,719 50
Butte.....	10,152 00	57 00	30 00	27 50	10,266 50
Calaveras.....	2,094 00	3 00	5 00	50	2,102 50
Colusa.....	1,346 00	3 00	5 00	3 50	1,357 50
Contra Costa.....	23,988 00	27 00	260 00	25 50	24,300 50
Del Norte.....	2,380 00	294 00		6 50	2,680 50
El Dorado.....	4,336 00	114 00	10 00	5 00	4,465 00
Fresno:					
Agents.....	21,442 00	15 00		6 00	21,463 00
Fresno Branch.....	706 00	39 00	235 00	25 50	1,005 50
Totals, Fresno.....	\$22,148 00	\$54 00	\$235 00	\$31 50	\$22,468 50
Glenn.....	1,458 00	9 00	10 00	2 50	1,479 50
Humboldt.....	12,490 00	51 00	60 00	27 50	12,628 50
Imperial.....	2,282 00	3 00		50	2,285 50
Inyo.....	10,522 00	219 00	80 00	26 00	10,847 00
Kern.....	11,388 00			3 50	11,391 50
Kings.....	3,012 00		35 00	1 00	3,048 00
Lake.....	5,608 00	9 00	5 00	6 50	5,628 50
Lassen.....	4,510 00	39 00	45 00	5 00	4,599 00
Los Angeles:					
Agents.....	193,988 00	117 00	90 00	56 00	194,251 00
Los Angeles Branch.....	614 00	90 00	435 00	43 00	1,182 00
Terminal Island Branch.....	186 00	6 00	30 00	6 50	228 50
Totals, Los Angeles.....	\$194,788 00	\$213 00	\$555 00	\$105 50	\$195,661 50
Madera.....	3,578 00			3 00	3,581 00
Marin.....	12,736 00	3 00	75 00	18 50	12,832 50
Mariposa.....	2,532 00	69 00	5 00	6 50	2,612 50
Mendocino.....	7,122 00	15 00		5 50	7,142 50
Merced.....	5,082 00	9 00	25 00	9 50	5,125 50
Modoc.....	2,718 00	159 00	5 00	6 00	2,888 00
Mono.....	5,556 00	561 00	5 00	15 50	6,137 50
Monterey:					
Agents.....	10,342 00	3 00	405 00	18 00	10,768 00
Monterey Branch.....		6 00	135 00		141 00
Totals, Monterey.....	\$10,342 00	\$9 00	\$540 00	\$18 00	\$10,909 00
Napa.....	9,460 00	6 00	20 00	14 50	9,500 50
Nevada.....	4,940 00	555 00	65 00	11 00	5,571 00
Orange.....	19,068 00	9 00		3 50	19,080 50
Placer.....	5,864 00	48 00	25 00	4 50	5,941 50
Plumas.....	6,666 00	171 00	65 00	16 50	6,918 50
Riverside.....	12,522 00	12 00	10 00	14 50	12,558 50
Sacramento:					
Agents.....	29,710 00		665 00	11 00	30,386 00
Sacramento Branch.....	468 00	90 00	\$55 00	55 00	1,463 00
Totals, Sacramento.....	\$30,178 00	\$90 00	\$1,520 00	\$66 00	\$31,854 00
San Benito.....	1,180 00	3 00	20 00	8 00	1,211 00
San Bernardino.....	41,074 00	51 00	50 00	33 50	41,208 50
San Diego:					
Agents.....	59,314 00	204 00		3 00	59,521 00
San Diego Branch.....	114 00	48 00	95 00	24 50	281 50
Totals, San Diego.....	\$59,428 00	\$252 00	\$95 00	\$27 50	\$59,802 50
San Francisco:					
Agents.....	60,022 00	6 00	615 00	24 00	60,667 00
San Francisco Branch.....	726 00	117 00	1,390 00	74 50	2,307 50
Totals, San Francisco.....	\$60,748 00	\$123 00	\$2,005 00	\$98 50	\$62,974 50
San Joaquin.....	23,980 00		115 00	21 00	24,116 00
San Luis Obispo.....	11,944 00	3 00	40 00	23 00	12,010 00
San Mateo.....	8,636 00	6 00	45 00	5 00	8,692 00
Santa Barbara.....	7,510 00	6 00	70 00	9 50	7,595 50
Santa Clara.....	19,402 00		175 00	16 50	19,593 50
Santa Cruz.....	6,788 00	9 00	385 00	19 00	7,201 00
Shasta:					
Agents.....	10,302 00	57 00	45 00	10 50	10,414 50
Redding Branch.....	182 00	27 00	55 00	7 50	271 50
Totals, Shasta.....	\$10,484 00	\$84 00	\$100 00	\$18 00	\$10,686 00

## FINAL STATEMENT OF ANGLING LICENSE SALES, 1943 SERIES—Continued

County	Citizen, \$2 each	Non-resident, \$3 each	Alien, \$5 each	Duplicate, 50c each	Total
Sierra.....	\$1,262 00	\$21 00	-----	\$1 50	\$1,284 50
Siskiyou.....	10,542 00	513 00	\$180 00	9 50	11,244 50
Solano.....	24,990 00	9 00	570 00	56 00	25,625 00
Sonoma.....	18,426 00	15 00	225 00	29 50	18,695 50
Stanislaus.....	15,372 00	12 00	90 00	14 50	15,488 50
Sutter.....	2,594 00	-----	-----	3 50	2,597 50
Tehama.....	2,968 00	-----	10 00	4 50	2,982 50
Trinity.....	1,400 00	3 00	-----	3 50	1,406 50
Tulare.....	11,110 00	6 00	-----	5 00	11,121 00
Tuolumne.....	3,454 00	24 00	-----	7 00	3,485 00
Ventura.....	8,662 00	3 00	-----	3 50	8,668 50
Yolo.....	3,120 00	30 00	5 00	6 00	3,161 00
Yuba.....	4,532 00	6 00	-----	6 00	4,544 00
Out of State:					
Arizona.....	378 00	279 00	-----	-----	657 00
Nevada.....	-----	3,732 00	-----	-----	3,732 00
Oregon.....	28 00	78 00	-----	50	106 50
Totals.....	\$881,808 00	\$8,331 00	\$8,675 00	\$968 00	\$899,782 00
Number.....	440,904	2,777	1,735	1,936	

## FINAL STATEMENT OF MARKET FISHERMAN LICENSE SALES, 1943 SERIES

County	\$10 each	Total
Contra Costa.....	-----	\$2,040 00
Del Norte.....	-----	120 00
Humboldt.....	-----	2,130 00
Los Angeles.....	-----	68,490 00
Mendocino.....	-----	1,000 00
Monterey.....	-----	9,650 00
Sacramento.....	-----	1,110 00
San Diego.....	-----	15,440 00
San Francisco.....	-----	17,020 00
Santa Cruz.....	-----	830 00
Solano.....	-----	250 00
Total.....	-----	\$118,080 00
Number.....	-----	11,808

## FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1942 SERIES

County	Hunting licenses						Deer tags		Trapping licenses		
	Citizen \$2 each	Junior \$1 each	Non- resident \$10 each	Declarant alien \$10 each	Alien \$25 each	Duplicate 50c each	Total Hunting	\$1 each	Citizen \$1 each	Alien \$2 each	Total Trapping
Alameda	\$29,232 00	\$1,102 00	\$30 00			\$33 00	\$30,397 00	\$7,594 00			
Alpine	128 00		60 00				188 00	72 00			
Anaheim	1,908 00	139 00				4 00	2,051 00	790 00			
Butte	12,412 00	1,075 00	40 00			31 00	13,558 00	3,514 00			
Calaveras	1,410 00	97 00				2 50	1,509 50	662 00			
Colusa	4,250 00	410 00			\$50 00	10 50	4,740 50	1,095 00			
Contra Costa	11,022 00	467 00				12 00	11,501 00	2,952 00			
Del Norte	920 00	46 00	10 00	10 00		1 50	987 50	235 00			
El Dorado	2,728 00	183 00				3 00	2,914 00	1,222 00			
Fresno:											
Agents	17,404 00	1,315 00				5 00	18,784 00	4,141 00	\$34 00		\$34 00
Fresno Branch	494 00	55 00	10 00	170 00	50 00	16 00	795 00	133 00			
Totals, Fresno	\$17,958 00	\$1,370 00	\$10 00	\$170 00	\$50 00	\$21 00	\$19,579 00	\$4,274 00	\$34 00		\$34 00
Glenn	4,048 00	419 00				14 00	4,481 00	1,197 00			
Humboldt	9,174 00	570 00				11 50	9,755 50	3,721 00			
Imperial	4,718 00	369 00				5 50	5,092 50	28 00			
Inyo	3,928 00	267 00				16 00	3,811 00	1,456 00			
Kern	12,382 00	766 00				7 50	13,155 50	2,606 00			
Kings	3,374 00	334 00				1 00	4,309 00	756 00			
Lake	3,100 00	288 00	10 00			8 00	3,406 00	1,568 00			
Lassen	5,428 00	354 00	40 00			6 50	5,828 50	2,547 00			
Los Angeles:											
Agents	74,136 00	2,519 00	10 00			25 50	76,690 50	7,525 00			
Los Angeles Branch	352 00	38 00	60 00	230 00	225 00	29 00	934 00	94 00	49 00		49 00
Terminal Island Branch	34 00	8 00				1 50	43 50	5 00			
Totals, Los Angeles	\$74,522 00	\$2,565 00	\$70 00	\$230 00	\$225 00	\$56 00	\$77,668 00	\$7,624 00	\$49 00		\$49 00



Madera.....	2,896 00	169 00				4 50	3,065 50	900 00		
Marin.....	4,228 00	252 00				3 50	4,483 50	1,401 00		
Mariposa.....	690 00	44 00					734 00	309 00		
Mendocino.....	6,952 00	468 00				5 50	7,425 50	3,023 00		
Merced.....	7,548 00	770 00				30 00	8,348 00	1,173 00		
Modoc.....	4,044 00	253 00				4 50	5,041 50	2,050 00		
Mono.....	1,054 00	20 00				50	1,113 50	470 00		
Monterey.....										
Agents.....	5,498 00	440 00				8 50	5,916 50	1,159 00		
Monterey Branch.....			30 00				30 00			
Totals, Monterey.....	\$5,498 00	\$440 00	\$30 00			\$8 50	\$5,946 50	\$1,159 00		
Napa.....	6,140 00	535 00				8 50	6,683 50	2,023 00		
Nevada.....	3,862 00	249 00				5 00	4,286 00	1,843 00		
Orange.....	4,738 00	412 00	130 00	40 00		2 50	5,152 50	596 00		
Placer.....	5,714 00	514 00	10 00			5 00	6,243 00	1,828 00		
Plumas.....	4,246 00	216 00	110 00		50 00	9 50	4,631 50	2,272 00		
Riverside.....	5,972 00	527 00				4 50	6,503 50	274 00		
Sacramento.....										
Agents.....	23,824 00	1,500 00			25 00	8 00	25,447 00	4,737 00		
Sacramento Branch.....	480 00	40 00	180 00	770 00	475 00	61 50	2,006 50	128 00	8 00	210 00
Totals, Sacramento.....	\$24,304 00	\$1,630 00	\$180 00	\$770 00	\$500 00	\$69 50	\$27,453 50	\$4,865 00	\$8 00	\$210 00
San Benito.....	1,488 00	157 00				7 00	1,652 00	556 00		
San Bernardino.....	8,352 00	586 00				12 00	8,950 00	515 00		
San Diego.....										
Agents.....	12,808 00	750 00				1 00	13,559 00	481 00		
San Diego Branch.....	32 00	2 00	10 00	10 00		12 50	66 50	3 00		
Totals, San Diego.....	\$12,840 00	\$752 00	\$10 00	\$10 00		\$13 50	\$13,625 50	\$484 00		
San Francisco.....										
Agents.....	20,222 00	535 00		50 00		5 50	26,812 50	6,300 00		
San Francisco Branch.....	414 00	76 00	160 00	1,040 00	425 00	49 00	2,164 00	180 00	24 00	860 00
Totals, San Francisco.....	\$20,636 00	\$611 00	\$160 00	\$1,090 00	\$425 00	\$54 50	\$28,976 50	\$6,480 00	\$24 00	\$860 00
San Joaquin.....	13,898 00	855 00				7 50	14,763 50	2,969 00		
San Luis Obispo.....	4,598 00	361 00				4 50	4,923 50	583 00		
San Mateo.....	5,906 00	379 00		130 00	75 00	4 50	6,494 50	1,539 00		
Santa Barbara.....	3,730 00	346 00				5 00	4,081 00	261 00		
Santa Clara.....	12,116 00	908 00		50 00		15 00	13,089 00	3,795 00		
Santa Cruz.....	4,220 00	369 00				9 50	4,598 50	1,324 00		
Shasta.....										
Agents.....	8,918 00	389 00	30 00			15 50	9,352 50	3,903 00		
Redding Branch.....	40 00	1 00	10 00	50 00	25 00	4 00	130 00	21 00	26 00	26 00
Totals, Shasta.....	\$8,958 00	\$390 00	\$40 00	\$50 00	\$25 00	\$19 50	\$9,482 50	\$3,924 00		\$26 00

## FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1942 SERIES—Continued

County	Hunting licenses						Deer tags		Trapping licenses		
	Citizen \$2 each	Junior \$1 each	Non- resident \$10 each	Declarant alien \$10 each	Alien \$25 each	Duplicate 50c each	Total Hunting	\$1 each	Citizen \$1 each	Alien \$2 each	Total Trapping
Sierra	\$698 00	\$46 00				\$1 00	\$745 00	\$379 00			
Siskiyou	10,770 00	757 00	\$5,510 00			19 50	17,056 50	4,824 00			
Solano	11,322 00	586 00				25 00	11,933 00	2,924 00			
Sonoma	10,834 00	924 00		\$50 00		11 00	11,819 00	4,237 00			
Stanislaus	9,278 00	973 00		50 00		12 50	10,313 50	1,948 00			
Sutter	2,842 00	227 00				7 50	3,076 50	540 00			
Tehama	3,550 00	345 00				7 50	3,902 50	1,294 00			
Trinity	1,060 00	42 00				50	1,102 50	566 00			
Tulare	10,436 00	868 00				5 00	11,309 00	2,753 00			
Tuolumne	1,878 00	162 00				2 00	2,042 00	886 00			
Ventura	2,950 00	259 00				1 00	3,210 00	472 00			
Yolo	6,222 00	553 00	20 00	20 00		14 50	6,829 50	1,541 00			
Yuba	6,750 00	607 00	10 00			11 50	7,378 50	1,728 00			
Out of State:											
Arizona	92 00						92 00	6 00			
Nevada	48 00		3,350 00				3,398 00	337 00*			
Oregon	1,064 00	9 00	4,420 00				6,093 00	457 00			
Totals	\$473,794 00	\$29,404 00	\$14,990 00	\$2,720 00	\$1,400 00	\$677 00	\$522,985 00	\$116,121 00	\$1,147 00	\$32 00	\$1,179 00
Number	236,897	29,404	1,499	272	56	1,354		116,121	1,147	16	

## FINAL STATEMENT OF MISCELLANEOUS LICENSE SALES BY BRANCH OFFICE AND AGENTS, 1942 SERIES

	Fresno	Los Angeles	Monterey	Redding	Sacramento	San Diego	San Francisco	Terminal Island	Agents	Total	Number
Commercial hunting club: Citizen, \$25 each.....							\$725 00			\$725 00	29
Commercial hunting club operator: Citizen, \$5 each.....							230 00			230 00	46
Alien, \$25 each.....							50 00			50 00	2
Totals.....							\$280 00			\$280 00	
Game tags, 3 cents each.....	\$1 98	\$120 66			\$24 54		76 80			223 98	7,466
Game breeder, \$2.50 each.....	45 00	730 00			150 00		245 00			1,170 00	468
Fish packer and shellfish dealer: Citizen, \$5 each.....							700 00	\$165 00		940 00	188
Fish importers, \$5 each.....						\$75 00	90 00			90 00	18
Fish party boat permits, \$1 each.....			\$9 00			2 00	152 00	135 00		298 00	298
Fish breeder, \$5 each.....							325 00			325 00	65
Fish tags, 1 cent each.....		40 00					3,681 00		\$30 66	3,751 66	375,166
Kelp license, \$10 each.....							60 00			60 00	6
Game management: License, \$10 each.....							180 00			180 00	18
Tags, 3 cents each.....							5 58			5 58	186
Antelope permits, \$5 each.....					2,500 00					2,500 00	500

## FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1943 SERIES

County	Hunting licenses						Deer tags	Trapping licenses				
	Citizen, \$2 each	Junior, \$1 each	Non- resident, \$10 each	Declarant alien, \$10 each	Alien, \$25 each	Duplicate, 50c each		Total hunting	\$1 each	Citizen, \$1 each	Alien, \$2 each	Total, trapping
Alameda	\$30,876 00	\$1,099 00		\$10 00		\$50 50	\$32,035 50	\$6,688 00				
Alpine	118 00		\$70 00				188 00	69 00				
Amador	2,140 00	125 00				3 00	2,268 00	1,019 00				
Butte	13,094 00	944 00	100 00			56 50	14,194 50	4,313 00				
Calaveras	1,688 00	131 00				2 00	1,821 00	857 00				
Colusa	3,948 00	337 00			\$25 00	16 50	4,346 50	721 00				
Contra Costa	11,436 00	410 00		20 00		16 00	11,612 00	2,519 00				
Del Norte	782 00	35 00	90 00	50 00		1 00	908 00	227 00				
El Dorado	3,320 00	208 00	30 00			10 00	3,568 00	1,738 00				
Fresno:												
Agents	18,440 00	1,166 00				7 00	19,613 00	6,212 00	\$53 00			\$53 00
Fresno Branch	960 00	77 00	50 00	160 00	175 00	42 00	1,404 00	327 00				
Totals, Fresno	\$19,400 00	\$1,243 00	\$50 00	\$160 00	\$175 00	\$49 00	\$21,077 00	\$6,539 00	\$53 00			\$53 00
Glen	\$4,016 00	\$349 00	\$20 00			\$18 00	\$4,403 00	\$654 00				
Humboldt	7,880 00	478 00				14 50	8,372 50	3,536 00				
Imperial	4,074 00	164 00				1 50	4,239 50	314 00				
Inyo	3,750 00	242 00				19 50	4,011 50	1,805 00				
Kern	13,904 00	637 00				10 50	14,551 50	3,817 00				
Kings	3,580 00	297 00				3 50	3,790 50	1,016 00				
Lake	1,808 00	142 00				5 50	2,015 50	410 00				
Lassen	5,534 00	374 00	90 00	\$50 00		14 50	6,062 50	2,705 00				
Los Angeles:												
Agents	88,558 00	2,562 00	40 00			48 50	91,208 50	23,762 00				
Los Angeles Branch	692 00	43 00	130 00	170 00	\$150 00	27 50	1,212 50	351 00	\$54 00			\$54 00
Terminal Island Branch	122 00	11 00				1 50	134 50	56 00				
Totals, Los Angeles	\$89,372 00	\$2,616 00	\$170 00	\$170 00	\$150 00	\$77 50	\$92,555 50	\$24,169 00	\$54 00			\$54 00

Madera	\$2,330 00	\$168 00				\$1 50	\$3,499 50	\$1,185 00		
Marin	4,632 00	147 00				5 50	4,184 50	735 00		
Mariposa		39 00				50	837 50	390 00		
Mendocino	2,982 00	187 00				2 00	3,171 00	807 00		
Merced	7,096 00	591 00				27 50	7,714 50	1,451 00		
Modoc	3,890 00	280 00				20 50	4,830 50	2,031 00		
Mono	962 00	110 00				6 50	1,047 50	482 00		
Monterey:										
Agents	7,018 00	451 00		\$50 00		13 50	7,532 50	2,341 00		
Monterey Branch				20 00	\$25 00		45 00			
Totals, Monterey	\$7,018 00	\$451 00		\$70 00	\$25 00	\$13 50	\$7,577 50	\$2,341 00		
Napa	\$4,776 00	\$370 00		\$10 00		\$13 50	\$5,169 50	\$1,050 00		
Nevada	4,462 00	274 00		50 00		11 50	5,037 50	2,219 00		
Orange	6,516 00	386 00				41 50	6,906 50	1,627 00		
Placer	6,572 00	486 00		20 00		12 50	7,090 50	2,704 00		
Plumas	4,608 00	256 00			\$25 00	12 50	5,071 50	2,396 00		
Riverside	7,496 00	513 00		80 00		14 50	8,023 50	1,901 00		
Sacramento:										
Agents	24,026 00	1,508 00		170 00	700 00	22 00	25,636 00	6,339 00	\$294 00	\$206 00
Sacramento Branch	1,422 00	81 00		460 00		71 50	2,904 50	329 00	\$12 00	\$306 00
Totals, Sacramento	\$25,448 00	\$1,589 00		\$540 00	\$700 00	\$93 50	\$28,540 50	\$6,668 00	\$294 00	\$306 00
San Benito	\$1,732 00	\$138 00				\$4 00	\$1,574 00	\$505 00		
San Bernardino		655 00		\$10 00		25 50	12,042 50	3,540 00		
San Diego:										
Agents	16,602 00	768 00				4 50	17,374 50	4,513 00		
San Diego Branch	148 00	13 00		\$10 00		12 00	193 00	86 00		
Totals, San Diego	\$16,750 00	\$781 00		\$10 00		\$16 50	\$17,567 50	\$4,599 00		
San Francisco:										
Agents	\$28,798 00	\$670 00		\$10 00		\$8 00	\$29,486 00	\$4,453 00		
San Francisco Branch	760 00	95 00		990 00	\$650 00	41 00	2,662 00	242 00	\$1,047 00	\$1,067 00
Totals, San Francisco	\$29,558 00	\$765 00		\$1,000 00	\$650 00	\$49 00	\$32,148 00	\$4,695 00	\$1,047 00	\$1,067 00
San Joaquin	\$16,604 00	\$772 00				\$22 50	\$17,398 50	\$4,202 00		
San Luis Obispo	4,040 00	242 00				11 50	4,293 50	702 00		
San Mateo	6,142 00	368 00		\$140 00	\$75 00	15 00	6,740 00	1,156 00		
Santa Barbara	4,282 00	287 00		20 00		5 00	4,624 00	1,205 00		
Santa Clara	11,992 00	795 00				11 50	12,878 50	3,057 00		
Santa Cruz	4,068 00	372 00		30 00	25 00	11 00	4,496 00	1,195 00		
Shasta:										
Agents	9,561 00	453 00		80 00		19 50	10,148 50	4,717 00		
Redding Branch	168 00	12 00		60 00	50 00	8 50	348 50	91 00	\$75 00	
Totals, Shasta	\$9,731 00	\$465 00		\$140 00	\$50 00	\$28 00	\$10,497 00	\$4,808 00	\$75 00	\$75 00



FINAL STATEMENT OF HUNTING, DEER TAGS, AND TRAPPING LICENSE SALES, 1943 SERIES—Continued

County	Hunting licenses						Deer tags		Trapping licenses		
	Citizen, \$2 each	Junior, \$1 each	Non- resident, \$10 each	Declarant alien, \$10 each	Alien, \$25 each	Duplicate, 50c each	Total hunting	\$1 each	Citizen, \$1 each	Alien, \$2 each	Total, trapping
Sierra	\$736 00	\$55 00				\$2 00	\$793 00	\$418 00			
Siskiyou	12,374 00	705 00	\$3,730 00	\$20 00		24 00	16,853 00	5,579 00			
Solano	11,064 00	553 00				29 50	11,646 50	2,182 00			
Sonoma	7,624 00	620 00		70 00		15 50	8,329 50	1,411 00			
Stanislaus	9,046 00	712 00		70 00		29 00	9,857 00	2,481 00			
Sutter	3,078 00	240 00				10 00	3,328 00	647 00			
Tehama	3,698 00	437 00				12 00	4,057 00	1,788 00			
Trinity	1,254 00	65 00				2 00	1,321 00	685 00			
Tulare	11,224 00	683 00				5 50	11,912 50	3,987 00			
Tuolumne	2,690 00	234 00	10 00	10 00		7 00	2,951 00	1,455 00			
Ventura	5,168 00	314 00				4 50	5,486 50	2,204 00			
Yuba	6,000 00	478 00	20 00	40 00		18 50	6,556 50	1,032 00			
Out of State:		323 00				19 00	6,342 00	1,635 00			
Arizona	\$56 00						\$56 00				
Nevada			\$4,930 00				4,930 00	\$513 00			
Oregon	748 00	\$2 00	6,800 00			\$2 50	7,552 50	530 00			
Totals	\$507,416 00	\$26,568 00	\$17,660 00	\$2,720 00	\$1,900 00	\$990 00	\$557,254 00	\$147,795 00	\$1,523 00	\$32 00	\$1,555 00
Number	253,708	26,568	1,766	272	76	1,980		147,795	1,523	16	



## FINAL STATEMENT OF PHEASANT TAG SALES, 1943 SERIES

County	\$1.00 each	Total
Alameda		\$10,671 00
Alpine		
Amador		326 00
Butte		5,669 00
Calaveras		242 00
Colusa		2,100 00
Contra Costa		4,261 00
Del Norte		20 00
El Dorado		432 00
Fresno:		
Agents		4,000 00
Fresno Branch		433 00
Total, Fresno		4,433 00
Glenn		2,152 00
Humboldt		318 00
Imperial		746 00
Inyo		849 00
Kern		1,790 00
Kings		867 00
Lake		669 00
Lassen		1,270 00
Los Angeles:		
Agents		6,782 00
Los Angeles Branch		132 00
Terminal Island Branch		14 00
Total, Los Angeles		6,928 00
Madera		769 00
Marin		1,138 00
Mariposa		116 00
Mendocino		695 00
Merced		3,016 00
Modoc		606 00
Mono		51 00
Monterey		962 00
Napa		1,903 00
Nevada		1,060 00
Orange		745 00
Placer		2,229 00
Plumas		641 00
Riverside		551 00
Sacramento:		
Agents		10,088 00
Sacramento Branch		1,116 00
Total, Sacramento		11,204 00
San Benito		265 00
San Bernardino		1,129 00
San Diego:		
Agents		665 00
San Diego Branch		8 00
Total, San Diego		673 00
San Francisco:		
Agents		8,810 00
San Francisco Branch		372 00
Total, San Francisco Branch		9,182 00
San Joaquin		5,911 00
San Luis Obispo		142 00
San Mateo		1,960 00
Santa Barbara		265 00
Santa Clara		3,515 00
Santa Cruz		975 00
Shasta:		
Agents		1,692 00
Redding Branch		95 00
Total, Shasta		1,787 00

## FINAL STATEMENT OF PHEASANT TAG SALES, 1943 SERIES—Continued

County	\$1.00 each	Total
Sierra .....		\$92 00
Siskiyou .....		2,190 00
Solano .....		4,535 00
Sonoma .....		2,819 00
Stanislaus .....		4,127 00
Sutter .....		1,694 00
Tehama .....		1,439 00
Trinity .....		11 00
Tulare .....		2,242 00
Tuolumne .....		356 00
Ventura .....		356 00
Yolo .....		3,310 00
Yuba .....		2,415 00
Out of State:		
Arizona .....		150 00
Nevada .....		217 00
Oregon .....		
Totals .....		\$121,186 00
Number .....		121,186

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH AND GAME,  
 RECORD OF FISH DISTRIBUTION  
 RECAPITULATION—1942

Trout		GENERAL FISH RESCUE	
Rainbow .....	12,908,387	Trout	
Steelhead .....	3,064,253	Rainbow .....	5,950
Golden .....	13,138	Steelhead .....	856,114
Black Spotted .....	419,000	Cutthroat .....	48
Cutthroat .....	735	Total .....	862,112
Loch Leven .....	3,712,350		
Eastern Brook .....	2,907,425		
Total .....	23,025,289		
		Salmon	
King .....	3,189,790	King .....	232,668
Silver .....	78,907	Silver .....	18,490
Total .....	3,268,697	Total .....	251,158
		Spiny Rayed	
Smallmouth Black Bass .....	36,614	Smallmouth Black Bass .....	685,362
Largemouth Black Bass .....	195	Largemouth Black Bass .....	1,418,269
Total .....	36,809	Striped Bass .....	9,634
		Sturgeon .....	2
		Sacramento Perch .....	3,500
		Crappie .....	88,383
		Squaretail Catfish .....	821,208
		Forkedtail Catfish .....	1,468,162
		Bluegill Sunfish .....	214,672
		Green Sunfish .....	397,330
		Warmouth Bass .....	41,890
		Shad .....	231
		Total .....	5,148,643

## DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from hatchery by county	Rainbow	Steelhead
ALPINE	Alpine	607,000	112,000	
ARROWHEAD LAKE	San Bernardino	20,600	20,600	
BASIN CREEK	Alpine	80,557	40,557	
	Calaveras	316,030	174,030	
	Tuolumne	659,105	428,325	
BEAR RIVER PLANTING BASE	Nevada	865,151	382,101	
	Placer	372,253	278,738	
	Sierra	84,807	84,807	
NOAH BEERY PURCHASED FISH	Los Angeles	52,122	52,122	
	San Bernardino	34,604	34,604	
BLACK ROCK SPRINGS	Inyo	231,070	231,070	
	Mono	32,174	32,174	
	Tulare	10,000	10,000	
BROOKDALE	Alameda	7,046	7,046	
	Marin	59,349	59,349	
	Monterey	94,842	36,008	41,070
	San Benito	9,225	9,225	
	San Mateo	84,564	9,138	75,426
	Santa Clara	98,450	98,450	
	Santa Cruz	617,194	16,177	618,777
	Solano	19,360	19,360	
BURNEY CREEK	Lassen	185,000	140,000	
	Modoc	526,000	365,000	
	Shasta	754,700	455,800	
	Siskiyou	30,000		
COY FLAT	Tulare	51,230	51,230	
EXPERIMENTAL	Siskiyou	15,535	15,181	
FALL CREEK	Siskiyou	3,838,490		648,700
FEATHER RIVER	Plumas	535,000	283,300	
	Sierra	169,395	69,995	
FILLMORE	Los Angeles	73,532	73,532	
	Riverside	16,800	16,800	
	San Bernardino	193,415	193,415	
	San Diego	41,500	41,500	
	San Luis Obispo	30,200	30,200	
	Santa Barbara	15,300	15,300	
	Ventura	111,830	111,830	
FISH SLOUGH	Inyo	94,994	37,977	
	Madera	1,001		
	Mono	6,048	6,048	
FORT SEWARD	Humboldt	537,056		537,056
	Mendocino	129,650		129,650
	Trinity	34,680		34,680
HOT CREEK	Inyo	61,960	61,960	
	Madera	27,000	27,000	
	Mono	1,293,100	758,561	
HUNTINGTON LAKE	Fresno	111,525	111,525	
KAWEAH	Tulare	648,214	287,307	
KERN	Kern	49,107	23,864	
	Tulare	242,388	214,638	
KINGS RIVER	Fresno	906,668	737,030	
LAKE ALMANOR	Butte	20,000		
	Lassen	285,202	173,802	
	Plumas	726,300	500,000	
	Shasta	124,000	100,000	
	Tehama	75,000	15,000	



## AND GAME, RECORD OF FISH DISTRIBUTION 1942

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscel- laneous	Miscel- laneous	Total
	419,000			76,000					607,000
									20,600
				40,000					
			142,000	91,680					1,055,692
			139,100						
			181,778	301,272					
			57,600	35,915					1,322,211
									86,726
									273,244
									990,030
			45,000						
			120,000	41,200					
			229,900	69,000					1,495,900
				30,000					
									51,230
			173	181					15,535
					3,189,790				3,838,490
			144,200	107,500					
			50,000	49,400					704,395
									482,577
2,047			54,970						
1,001									102,043
									701,386
10,090			376,429	148,020					1,382,060
									111,525
			180,482	180,425					648,214
			25,243						291,495
			27,750						
			110,265	59,373					906,668
				20,000					
			15,000	96,400					
			130,000	22,000		74,300			
				24,000					
			30,000	30,000					1,230,502

## DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from hatchery by county	Rainbow	Steelhead
MADERA.....	Madera.....	487,526	227,738	-----
MOUNT SHASTA.....	Alpine.....	74,000	69,000	-----
	Amador.....	148,500	116,000	-----
	Butte.....	448,000	287,000	-----
	El Dorado.....	468,500	333,000	-----
	Lassen.....	40,000	40,000	-----
	Modoc.....	16,570	15,000	-----
	Plumas.....	25,000	25,000	-----
	Shasta.....	582,720	426,720	-----
	Siskiyou.....	900,558	646,263	-----
	Tehama.....	255,000	200,000	-----
	Trinity.....	466,000	158,000	160,000
	Yuba.....	10,000	10,000	-----
MOUNT WHITNEY.....	Fresno.....	80,750	73,760	-----
	Inyo.....	571,638	185,026	-----
	Madera.....	118,080	118,080	-----
	Mono.....	282,207	108,587	-----
PLASKETT MEADOWS PLANTING BASE.....	Colusa.....	6,000	6,000	-----
	Glenn.....	25,000	25,000	-----
PRAIRIE CREEK.....	Del Norte.....	229,910	-----	229,910
	Humboldt.....	553,402	-----	548,660
	Marin.....	600	-----	-----
	Trinity.....	40,320	-----	40,320
REARING RESERVOIRS.....	Los Angeles.....	62,296	62,296	-----
	Orange.....	4,000	4,000	-----
	Riverside.....	5,120	5,120	-----
	San Bernardino.....	87,107	87,107	-----
	San Diego.....	10,452	10,452	-----
SEQUOIA.....	Fresno.....	59,706	59,706	-----
	Tulare.....	39,041	39,041	-----
TAHOE.....	Alpine.....	10,000	-----	-----
	El Dorado.....	514,700	86,000	-----
	Nevada.....	81,280	-----	-----
	Placer.....	291,185	66,560	-----
TALLAC.....	El Dorado.....	1,138,690	1,138,690	-----
	Nevada.....	150,240	150,240	-----
	Placer.....	60,000	60,000	-----
YOSEMITE.....	Mariposa.....	719,400	438,300	-----
	Tuolumne.....	463,000	377,400	-----
YUBA RIVER.....	Nevada.....	85,915	-----	-----
	Sierra.....	363,700	209,625	-----
Grand totals.....	-----	26,293,636	12,908,387	3,064,253

## AND GAME, RECORD OF FISH DISTRIBUTION—1942—Continued

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscel- laneous	Miscel- laneous	Total
			144,643	115,145					487,526
				5,000					
			15,000	17,500					
			151,000	10,000					
			90,000	45,500					
			1,570						
			142,000	14,000					
			76,195	178,100					
			55,000						
				148,000					3,434,848
				16,990					
			242,992	143,620					
				173,970					1,053,025
									31,000
		135				4,607			
		609							
									824,232
									168,975
									98,747
				10,000					
			47,000	381,700					
				81,280					
			179,625	45,000					897,165
									1,348,930
			281,100						
			85,600						1,182,400
			65,925	19,990					
			74,810	79,265					449,615
13,138	419,000	735	3,712,350	2,907,426	3,189,790	78,907			26,293,986

## CENTRAL VALLEYS BASS HATCHERY

Source	County	Small-mouth Black Bass	Large-mouth Black Bass	Kentucky Bass	Striped Bass
CENTRAL VALLEYS BASS HATCHERY	Santa Cruz		125		

## SALMON AND TROUT RESCUE

Source	County	Rainbow	Steelhead
CENTRAL VALLEYS FISH RESCUE	Sacramento Yolo		
NORTH COAST FISH RESCUE	Del Norte Humboldt Mendocino		256 349,138
SOUTHERN CALIFORNIA FISH RESCUE	Riverside San Bernardino San Luis Obispo Santa Barbara Ventura	3,650 2,300	16,000 406,300 3,800
UPPER EEL RIVER FISH RESCUE	Lake		196,438
UPPER EEL RIVER FISH RESCUE	Sonoma		26,743
TOTAL TROUT AND SALMON RESCUE		5,950	998,675

## RECAPITULATION—1942

Calico Bass	Sacra-ments Perch	Crappie	Square-tail Catfish	Forked-tail Catfish	Bluegill Sunfish	Mixed Sunfish	Miscel-laneous	Miscel-laneous	Total
			30			40			195

## RECAPTULATION—1942

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscel-laneous	Miscel-laneous	Total
					50,600				50,600
					165,130				165,130
		48			16,938	18,034			35,276
						456			456
									349,138
									3,650
									2,300
									16,000
									406,300
									3,800
									196,438
									26,743
		48			232,668	18,490			1,255,831

## DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH AND GAME,

## RECORD OF FISH DISTRIBUTION

## RECAPITULATION—1943

Trout		GENERAL FISH RESCUE	
Rainbow.....	13,784,642	Trout	
Steelhead.....	1,974,801	Rainbow.....	4
Black Spotted.....	53,883	Steelhead.....	1,333,939
Loch Leven.....	1,569,530	Cutthroat.....	48
Eastern Brook.....	1,722,200	Loch Leven.....	23
Total.....	19,105,056	Total.....	1,334,014
Salmon		Salmon	
King.....	3,503,320	King.....	239,820
Silver.....	105,325	Silver.....	32,362
Total.....	3,608,645	Total.....	272,182
		Spiny Rayed	
		Smallmouth Black Bass.....	322,597
		Largemouth Black Bass.....	752,999
		Sacramento Perch.....	100,000
		Crappie.....	32,561
		Squaretail Catfish.....	406,155
		Forkedtail Catfish.....	314,419
		Bluegill Sunfish.....	134,854
		Green Sunfish.....	29,821
		Warmouth Bass.....	16,644
		Sturgeon.....	3
		Total.....	2,110,053



## DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from hatchery by county	Rainbow	Steelhead
ALPINE	Alpine	63,160	40,200	
	Amador	3,200		
	Calaveras	308,980	201,980	
	Tuolumne	708,200	565,680	
BLACK ROCK	Alpine	2,240		
	Inyo	258,854	249,615	
	Mono	37,421	12,384	
	Tulare	4,760	4,760	
BROOKDALE	Alameda	1,080	1,080	
	Marin	43,009	43,009	
	Monterey	88,436	34,188	54,248
	San Benito	9,154	9,154	
	San Mateo	82,177	9,029	73,148
	Santa Clara	134,064	134,064	
	Santa Cruz	362,040	48,717	313,323
BURNEY CREEK	Lassen	154,000	144,000	
	Modoc	339,000	258,000	
	Shasta	834,375	648,500	
	Siskiyou	30,000		
COY FLAT	Tulare	107,608	107,608	
FALL CREEK	Siskiyou	3,646,480	58,350	576,730
FEATHER RIVER	Plumas	331,850	266,109	
	Sierra	125,800	89,200	
FILLMORE	Los Angeles	203,329	203,320	
	Orange	15,650	15,650	
	Riverside	39,800	39,800	
	San Bernardino	391,600	391,600	
	San Diego	25,025	25,025	
	San Luis Obispo	5,850	5,850	
	Santa Barbara	21,600	21,600	
	Ventura	121,515	121,515	
HOT CREEK	Alpine	7,900	7,900	
	Fresno	53,800	53,800	
	Inyo	40,220	21,620	
	Madera	71,335	71,335	
	Mono	1,133,264	811,827	
KAWEAH	Tulare	182,370	10,029	
KERN	Kern	73,862	73,862	
	Tulare	214,688	214,688	
KINGS RIVER	Fresno	608,638	605,305	
LAKE ALMANOR	Lassen	174,440	174,000	
	Plumas	642,706	478,206	
	Shasta	26,000	10,000	
	Tehama	75,000	75,000	
MADERA	Fresno	5,550		
	Madera	434,161	270,106	
MOUNT SHASTA	Alpine	80,000	75,000	
	Amador	170,000	129,000	
	Butte	400,000	337,000	
	El Dorado	432,000	402,000	
	Glenn	20,000	20,000	
	Lake	5,000	5,000	
	Modoc	9,002	9,002	
	Nevada	706,000	561,000	
	Placer	453,000	309,000	
	Plumas	45,000	45,000	
	Shasta	613,764	585,764	
	Sierra	40,000	40,000	
	Siskiyou	1,060,992	851,010	
	Tehama	328,000	273,000	
	Trinity	437,390	402,200	
	Yuba	10,000	10,000	

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscellaneous	Miscellaneous	Total
				22,960 3,200					
			107,000 85,800	56,720					1,083,540
	2,240 9,239 25,037								303,275
									719,960
			10,000 40,000 88,525	41,000 97,350 30,000					1,357,375
					3,011,400				107,608
				65,750 36,600					3,646,480
									457,650
									824,360
			15,200	3,400					
	17,367		109,200	194,870					1,306,519
				172,350					182,370
									288,550
				3,333					608,638
				440 68,100 16,000		96,400			918,146
			87,975	5,550 76,080					439,711
			15,000 53,000 20,000	5,000 35,000 10,000 10,000					
			50,000 134,000	95,000 10,000					
			25,000	3,000					
			55,900 55,000	154,082 35,190					4,810,148

## DEPARTMENT OF NATURAL RESOURCES, DIVISION OF FISH

Hatchery	County	Total from hatchery by county	Rainbow	Steelhead
MOUNT WHITNEY .....	Fresno .....	21,990	15,990	-----
	Inyo .....	395,189	152,559	-----
	Mono .....	310	310	-----
	Tulare .....	50,990	50,990	-----
PRAIRIE CREEK .....	Del Norte .....	766,840	10,000	264,920
	Humboldt .....	761,705	60,348	692,432
SEQUOIA .....	Fresno .....	101,899	101,899	-----
	Tulare .....	319,818	319,818	-----
TAHOE .....	El Dorado .....	667,910	305,020	-----
	Placer .....	239,420	196,280	-----
TALLAC .....	El Dorado .....	804,965	804,965	-----
	Nevada .....	32,650	32,650	-----
	Placer .....	102,150	102,150	-----
YOSEMITE .....	Mariposa .....	787,270	489,770	-----
	Tuolumne .....	228,940	151,140	-----
YUBA RIVER .....	Sierra .....	378,135	283,750	-----
	Yuba .....	18,380	18,380	-----
Totals .....	-----	22,732,891	13,784,642	1,974,801

## AND GAME, RECORD OF FISH DISTRIBUTION—1943—Continued

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscel- laneous	Miscel- laneous	Total
				6,000					
			242,630						468,479
					491,920				
						8,925			1,528,545
									421,717
				362,890					
				43,140					907,330
									939,765
			297,500						
			77,800						1,016,210
				94,385					
									396,515
	53,883		1,560,530	1,757,390	3,503,320	105,325			22,732,891

## SPINY RAYED FISH RESCUE

Source	County	Small-mouth Black Bass	Large-mouth Black Bass	Kentucky Bass	Striped Bass
CENTRAL VALLEYS FISH RESCUE-----	Contra Costa-----		180		
	Fresno-----	3,000	14,228		
	Kern-----		250		
	Kings-----		800		
	Merced-----		598		
	Napa-----		171,500		
	Sacramento-----		542,249		
	San Francisco-----		6,608		
	San Joaquin-----	168,985			
	San Mateo-----				
	Solano-----	52,792	3		
	Stanislaus-----		1,140		
	Sutter-----		13		
	Yolo-----	97,820	11,010		
COAST FISH RESCUE-----	Santa Clara-----				
SOUTHERN CALIFORNIA FISH RESCUE--	Kern-----		150		
	Los Angeles-----		350		
	Riverside-----		2,485		
	San Bernardino-----		1,130		
	San Diego-----		280		
	San Luis Obispo-----				
	Ventura-----		25		
TOTAL FISH RESCUE (SPINY RAYED)-----		322,597	752,999		



## RECAPITULATION—1943

Calico Bass	Sacramento Perch	Crappie	Square-tail Catfish	Forked-tail Catfish	Bluegill Sunfish	Green Sunfish	War-mouth Bass	Sturgeon	Total
					450				630
		9,014	11,093	55	6,151	280			43,821
		275	475						1,000
			800						1,600
		157	49	3,750	130		71		4,755
									171,500
	100,000	12,560	392,334	130,047	75,894	940	15,880	1	1,269,905
		247	2	80,500	1,622	2,010	190		253,556
			240	150					390
									52,795
		444	61	2,367	1,730	16	413		6,171
		14		36,100		24,000			60,127
		50	1,000	61,450	950	2,500	90	2	174,872
			92		116				208
		2,500			8,000				10,650
		2,680			13,940				16,970
		1,840			9,710				14,035
		400	9		7,586				9,125
		1,940			7,000				9,220
		390			900				1,290
		50			675	75			825
	100,000	32,561	406,155	314,419	134,854	29,821	16,644	3	2,110,053

## TROUT AND SALMON RESCUE

Source	County	Rainbow	Steelhead
CENTRAL VALLEYS FISH RESCUE.....	Placer.....	4	
	Sacramento.....		
	Sutter.....		
	Yolo.....		
NORTH COAST FISH RESCUE.....	Del Norte.....		10,063
	Humboldt.....		
	Lake.....		206,872
	Mendocino.....		311,700
	Santa Clara.....		4
SOUTHERN CALIFORNIA FISH RESCUE.....	Santa Barbara.....		778,100
	Ventura.....		27,200
TOTAL TROUT AND SALMON RESCUE.....		4	1,333,939

## RECAPITULATION—1943

Golden	Black Spotted	Cutthroat	Loch Leven	Eastern Brook	King Salmon	Silver Salmon	Miscel- laneous	Miscel- laneous	Total
			23						27
					93,800				93,800
					70,300				70,300
					69,060				69,060
		48			6,660	23,402			40,173
						8,960			8,960
									206,872
									311,700
									4
									778,100
									27,200
		48	23		239,820	32,362			1,606,196

## PREDATORY ANIMAL CATCH BY COUNTIES

	July 1, 1942 to June 30, 1943				July 1, 1943 to June 30, 1944				Total for bien- nium
	Coyote	Bobcat	Other predators	Total	Coyote	Bobcat	Other predators	Total	
Alpine.....					15			15	15
Amador.....	29	5	7	41	51	2	5	58	99
Calaveras.....	2		10	12		1		1	13
El Dorado.....	26	2	74	102	55	7	26	88	190
Fresno.....	70	2	11	83	79	5	10	94	177
Glenn.....	6	3	23	32	46	26	56	128	160
Inyo.....	65	6	6	77	116	20	28	164	241
Kern.....	156	38	29	223	77	14	9	100	323
Lake.....					1			1	1
Lassen.....	169	15	23	207	311	19	53	383	590
Los Angeles.....	95	12	31	138	125	49	37	211	349
Marin.....						1	1	2	2
Mariposa.....	17	28	35	80	43	28	72	143	223
Modoc.....	145	6	52	203	118	3	65	186	389
Mono.....	119	9	10	138					138
Monterey.....	87	54	137	278	137	50	98	285	563
Nevada.....	24	2	130	156	39	6	293	338	494
Placer.....	44	6	31	81					81
Plumas.....	9		21	30	18	1	49	68	98
Riverside.....	149	34	123	306	183	51	244	478	784
San Benito.....	162	87	171	420	210	100	155	465	885
San Bernardino.....	58	20	11	89	145	28	114	287	376
San Diego.....	370	85	360	815					815
San Luis Obispo.....	236	87	127	450	113	37	87	237	687
Santa Barbara.....	338	97	76	511	445	96	78	619	1,130
Santa Clara.....	13	1	27	41					41
Santa Cruz.....	4	6	31	41					41
Shasta.....	60	5	45	110	23	6	21	50	160
Siskiyou.....	1			1	60	17		77	78
Stanislaus.....	71	26	87	184	58	7	14	79	263
Tehama.....	9	2	10	21	13			13	34
Trinity.....	78	16	19	113	38	8	12	58	171
Tulare.....	94	19	125	238	73	10	117	200	438
Tuolumne.....	80	21	97	198	93	9	89	191	389
Ventura.....	94	20	25	139	8			8	147
Yuba.....	5		17	22					22
Totals.....	2,885	714	1,981	5,580	2,693	601	1,733	5,027	10,607

	1942-43	1943-44
Average number of trappers.....	21	22
Miles of trapline.....	182,147	214,285
Number of sets.....	253,865	264,465
Number of days.....	6,696	6,546

ARRESTS AND CONVICTIONS  
RECAPITULATION

	Number of arrests	Fines imposed	Jail sentences (days)
Fish cases, 1942-1943 .....	1035	\$31,692 50	100
Game cases, 1942-1943 .....	1076	41,497 50	238
Totals, 1942-1943 .....	2111	\$73,190 00	338
Fish cases, 1943-1944 .....	1079	\$28,768 00	197
Game cases, 1943-1944 .....	1108	50,550 00	180
Totals, 1943-1944 .....	2187	\$79,318 00	377
Recapitulation:			
1942-1943 .....	2111	\$73,190 00	338
1943-1944 .....	2187	79,318 00	377
Totals .....	4298	\$152,508 00	715

TOTAL ARRESTS FOR A PERIOD OF FORTY-TWO YEARS

1902-1904 .....	550
1904-1906 .....	774
1906-1908 .....	1,192
1908-1910 .....	1,771
1910-1912 .....	2,063
1912-1914 .....	1,993
1914-1916 .....	2,087
1916-1918 .....	1,797
1918-1920 .....	1,891
1920-1922 .....	2,258
1922-1924 .....	2,715
1924-1926 .....	3,207
1926-1928 .....	4,390
1928-1930 .....	5,388
1930-1932 .....	5,237
1932-1934 .....	3,795
1934-1936 .....	4,535
1936-1938 .....	6,382
1938-1940 .....	7,444
1940-1942 .....	7,262
1942-1944 .....	4,298



## SEIZURES OF FISH AND GAME

Fish	July 1, 1942, to June 30, 1943	July 1, 1943, to June 30, 1944	Total
Abalones.....	121	234	355
Abalones, red.....	626	735	1,361
Abalones, green.....	128	23	151
Abalones, black.....	126	202	328
Barracuda.....	57		57
Bass, black.....	160	164	324
Bass, striped.....	44	25	69
Bass, pounds.....	6,077		6,077
Bass, striped, pounds.....	853	1,577	2,430
Bluegill.....		53	53
Bluegill, pounds.....	9		9
Clams.....		528	528
Clams, Pismo.....	489	108	597
Clams, Cockles.....	102	101	203
Clams, Horseneck.....	50		50
Catfish.....	19	23	42
Catfish, pounds.....	16	400	416
Crappie.....	76	48	124
Crappie, pounds.....	5		5
Fish spear.....	1		1
Frogs.....	10		10
Gill nets.....	2		2
Lobster, pounds.....	21		21
Lobster, traps.....	16	153	169
Lobster, receiver.....		1	1
Lobsters, spiny.....	8	72	80
Lobsters.....	7	23	30
Perch.....	1	4	5
Perch, saltwater, pounds.....		50	50
Salmon.....	95	52	147
Salmon, pounds.....		520	520
Salmon, net.....	1		1
Salmon, King.....		25	25
Salmon, Silver, pounds.....		45	45
Scallops.....	214		214
Shad, pounds.....		102	102
Sturgeon, pounds.....	42½		42½
Sunfish.....	388	175	563
Sunfish, pounds.....	4		4
Sunperch.....	25	18	43
Swordfish, Marlin, pounds.....		3,000	3,000
Trammel nets, pieces.....		11	11
Trout, Easternbrook.....		62	62
Trout, pounds.....	1¼	22	23¼
Trout, steelhead.....	244	69	313
Trout, steelhead, pounds.....		2½	2½
Trout, rainbow.....	277	856	1,133
Trout, rainbow, pounds.....		35	35
Trout, Loch Leven.....	7		7
Trout.....	820	1,028	1,848
Tuna.....	15,300		15,300

## SEIZURE OF FISH AND GAME—Continued

Game	July 1, 1942, to June 30, 1943	July 1, 1943, to June 30, 1944	Total
Antelope.....	1		1
Bear meat, pounds.....		60	60
Deer.....	39	96	135
Deer meat, pounds.....	1,623	1,642½	3,265½
Deer meat, canned, jars.....	32		32
Doe.....	2		2
Doe meat, pounds.....	60		60
Doves.....	303	377	680
Ducks.....	653	754	1,407
Elk.....		1	1
Geese.....	20	69	89
Jacksnipe.....	1		1
Killdeer.....	2		2
Meadowlark.....	1		1
Pheasants.....	219	366	585
Pigeons.....	1	1	2
Quail.....	39	13	52
Rabbits, brush.....	28	17	45
Rabbits, jack.....	2		2
Rabbits, cottontail.....	74		74
Squirrel, tree.....		13	13
Squirrel, grey.....		2	2
Sagehens.....	5	2	7
Shorebirds.....	1		1
Sparrows.....		12	12
Swans.....	14	3	17
White crowned sparrows.....	5		5
Woodducks.....	7	3	10
Wilson snipe.....	2		2

## FISH CASES

Offense	July 1, 1942, to June 30, 1943			July 1, 1943, to June 30, 1944		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Abalones: Undersize, overlimit, out of shell, no license, closed season, remove from shell below high tide, fail to show license on demand, no commercial license	211	\$5,283 00		246	\$6,592 50	
Angling: No license, closed season, closed area, within 150 feet of dam, not holding rod, false statement in securing license, set lines after sundown, two poles, fish gaff 300 feet of stream, fishing in fish ladder, closed waters, lending license to another, illegally taken fish, using trout roe for bait, back dating angling license, operating set line	214	3,743 50	10	292	5,250 50	140
Barracuda: Overlimit, undersize, no license	3	30 00				
Bass: Undersize, using two rods, after sundown, night fishing, closed season, no license, two lines, overlimit, possess for sale, fail return bass to water taken in shad net, buying striped bass	115	2,558 00	16	132	2,855 00	
Bass, black: No license	32	860 00		23	635 00	
Catfish: Selling, undersize, closed season, use of net to take catfish, closed waters	4	105 00		4	135 00	
Clams: Undersize, clam forks in preserve, take clams in preserve, out of shell, overlimit, no license, closed season	90	1,832 50	29	69	1,460 00	15
Cockles: Overlimit	2	50 00				
Commercial: Operating net and taking tuna in closed season, gill net in closed waters, no license, failure give fishermen copy at delivery, operating round whole net in District 20, operating net Stanislaus River, operating purse seine net and taking bluefin tuna in closed area, failure to keep record of fresh fish purchased and from whom	68	4,340 00		36	2,770 00	
Crabs: Undersize, closed season, overlimit	3	50 00				
Crappie: Selling	16	425 00		2	70 00	
Fail show fish on demand	8	100 00	5			
Frogs: Overlimit, closed season, no license	4	125 00				
Game fish: Taken illegally	33	655 00				
Gill net: Closed area, meshes over $\frac{3}{4}$ " in length	3	150 00				
Habibut: Closed season	2	100 00				
Lobsters: Closed season, undersize, overlimit	8	432 50		6	220 00	
No party boat permit	2	25 00				
Operating fish trap	1	50 00		2	200 00	
Perch: Closed season, no license	3	60 00		3	85 00	
Pollution	47	6,250 00	5	6	975 00	
River otter: Closed season				1	10 00	
Salmon: Undersize, taken illegally, other than angling, at night, at fish screen, no license, spear- ing, night spearing	38	810 00	35	79	2,735 00	30
Spearing: Spearing in prohibited area, 300 feet of stream, using gaff hook	5	125 00		4	80 00	
Steelhead: Taken illegally, overlimit, no license, possess 34 tagged steelhead, District 1 $\frac{1}{2}$	5	135 00				
Sturgeon: Possession	2	50 00				
Sunfish: No license, closed season, overlimit	46	950 00		15	422 50	12
Trout: Overlimit, closed area, not using hook and line, sale, more than one pole, closed area, closed season, snagging with "spanish liver," taking steel- head other than in tidewater	66	1,798 00		154	4,022 50	
Tuna: Closed area, selling, closed lake, without a commercial license	2	550 00				
Taking marine life within marine refuge	1	25 00				
Use nonnative minnows as bait				1	25 00	
Use and possess otter board trawl				4	225 00	
Wilful waste of food fish	1	25 00				
Totals	1,035	\$31,692 50	100	1,079	\$28,768 00	197

## GAME CASES

Offense	July 1, 1942, to June 30, 1943			July 1, 1943, to June 30, 1944		
	Arrests	Fines	Jail	Arrests	Fines	Jail
Antelope: Closed season	2	\$160 00				
Bear: Closed season, refuge	2	100 00		3	\$100 00	
Beaver: No commercial license	1	75 00				
Coots: Shooting with 22 rifle	2	25 00				
Deer: Night hunting, refuge, take forked horn deer in District 134, transfer deer tags, overlimit, closed season, doe, no tags, failure to have deer tag validated, spike buck, fawn, altering deer tags, fawn, two deer in a one deer district, firearms, spotlighting, unplugged gun, early and late shooting, allowing hounds to run deer during closed season	179	9,617 00	54	301	18,780 00	95
Deer meat: Closed season, female, unstamped, no permit, illegally taken	69	5,432 00	74	76	5,090 00	
Doves: Closed season, shooting from auto, no license, overlimit, taking by trap, use license of another, unplugged gun	49	1,375 00		36	1,710 00	30
Ducks: Closed season, early and late shooting, overlimit, no license, unplugged gun, no duck stamp, failure to show game on demand, taking young from nest, shore bird possess baby ducks	273	9,046 00		182	8,077 50	55
Elk: Overlimit, cow				2	200 00	
Firearms: Refuge, shooting from highway	25	575 00		5	85 00	
Fox, grey: Closed season	1	10 00				
Game birds: Closed season, selling domesticated game birds, no license	2	50 00		5	400 00	
Geese: Overlimit, unplugged gun, refuge, no license, harrying geese with ear, after sunset	8	205 00		28	852 50	
Hunting: No license, failure show license on demand, transfer of license, hunting in refuge, falsifying in order to secure citizen's license, at night, use license of another, spotlighting, refuse to show license on demand	94	1,992 00		121	3,230 00	
Jacksnipe	1	12 50				
Meadowlark	1	25 00				
Mudhens: No license	1	35 00		1	10 00	
Musk rats: Trapping for profit, no license				3	20 00	
Mountain Sheep: Kill and possess	2	200 00				
Nongame birds	15	310 00		7	200 00	
Pheasants: Closed season, hen, no license, set lines to take pheasants, failing to tag, trapping hen, no tags, shooting from auto	180	8,448 50	105	270	9,940 00	
Pigeons: Closed season	2	50 00		1	50 00	
Quail: Closed season, no license	30	650 00		18	585 00	
Rabbits: Closed season, no license	46	694 50	5	4	100 00	
Robins and flickers	1	70 00				
Sagehens: Closed season	5	325 00		4	150 00	
Seized evidence destroyed				1	10 00	
Shooting from auto	15	405 00		25	540 00	
Shorebirds	7	155 00		2	20 00	
Squirrels, tree	2	55 00		3	200 00	
Swans	2	125 00		3	60 00	
Taking birds with trap				1	25 00	
Trapping: Disturbing traps of licensed trapper, trapping for profit, no license	1	10 00		5	105 00	
Trespassing	2	75 00		1	10 00	
Waterfowl: Closed season, early and late shooting, no license, overlimit, no duck stamp	46	945 00				
Willits	1	25 00				
Wilson snipe	1	25 00				
Woodducks	8	195 00				
Totals	1,076	\$41,497 50	238	1,108	\$50,550 00	180









## CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1942

Compiled by Division of Fish and Game, Bureau of Marine Fisheries

Species of fish	Eureka region	Sacramento region	San Francisco region	Monterey region	Santa Barbara region
Albacore.....	11,616		8,286	284,684	577,893
Anchovy.....			5,400	149,076	75
Barracuda.....					256,281
Bonito.....					33,727
Cabezone.....			504	1,788	12
Cabrilla.....					
Carp.....		39,968			
Catfish.....		170,580			
Cultus, Pacific.....	200,828		42,261	68,230	484
Eel.....					103
Flounder.....	265,255		89,101	15,168	60
Flying Fish.....					66
Grouper.....					
Hake.....	25		2,991	38,920	
Halibut, California.....			6,140	12,226	275,673
Halibut, Northern.....	233,462				
Hardhead.....		92,822			
Herring, Pacific.....	22,042		109,022	59,730	21
Kingfish.....			1,617	89,305	
Mackerel, Horse.....				323,886	
Mackerel, Pacific.....			122,230	802,896	1,086,595
Mackerel, Spanish.....					
Mullet.....					
Perch.....	24,113		14,498	5,578	3,144
Pike.....		173			
Pompano, California.....				79	2
Rock Bass.....					38,980
Rockfish.....	269,134		70,019	655,899	83,767
Sablefish.....	1,625,819		29,512	290,874	2,382
Salmon.....	2,255,862	2,552,944	1,642,051	164,931	462
Sand Dab.....	162,671		112,555	67,309	7
Sardine.....	179	44,790,700	165,896,261	332,491,022	10,234,078
Sculpin.....					221
Sea-bass, Black.....			142	34	4,940
Sea-bass, Short-fin.....					
Sea-bass, White.....	5,714		14,440	115,138	77,485
Shad.....	38	2,571,595			
Shark.....	800,563		1,155,759	312,371	407,936
Sheepshead.....					35,178
Skate.....	12,938		54,410	19,162	11,242
Skipjack.....					
Snelt.....	37,877	164	166,927	108,048	11,327
Sole.....	2,066,856		589,773	378,673	100,863
Split-tail.....		15,391			
Sucker.....		95			
Swordfish, Broadbill.....					246,011
Toinod.....	145				
Tuna, Bluefin.....			159		122,640
Tuna, Yellowfin.....					25
Turbot.....	3,095		3,001	21	439
Whitebait.....	151,022		8,227	9	
Whitefish, Ocean.....	94				26,751
Yellowtail.....					115
Miscellaneous Fish.....	24,349		16,743	13,677	28,295
Total fish, in pounds.....	8,173,697	50,234,432	170,162,029	336,468,734	13,667,280
Crustacean:					
Crab.....	694,486		1,638,944	80,656	
Shrimp.....			800,958		
Spiny Lobster.....					71,441
Mollusk:					
Abalone.....				3,675	160,787
Clam, Cockle.....			257		
Clam, Gaper.....			760		
Clam, Pismo.....				3,000	90,613
Clam, Soft-shell.....			73,144		
Clam, Washington.....	9,848				
Octopus.....	2,226		1,015	4,140	
Oyster, Eastern.....			92,426		
Oyster, Japanese.....			317,216		292,017
Oyster, Native.....	4,070		1,612		
Squid.....				875,732	
Total shellfish, in pounds.....	710,630		2,926,332	967,203	614,858
Grand total, in pounds.....	8,884,327	50,234,432	173,088,361	337,435,937	14,282,138

NOTE: All amounts shown in pounds. This record does not include albacore shipped from Oregon and Washington

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1942—Continued  
Compiled by Division of Fish and Game, Bureau of Marine Fisheries

Species of fish	Los Angeles region.....	San Diego region.....	Total taken in state waters and off the coast of California.....	South of International Boundary brought into Los Angeles.....	South of International Boundary brought into San Diego.....	Total landings in California, including fish from west coast south of the International Boundary brought in by boat.....
Albacore.....	4,941,674	2,173,140	7,997,293	121,250	2,502,650	10,621,193
Anchovy.....	1,539,334	405	1,694,290			1,694,290
Barracuda.....	250,926	250,926	2,243,163	1,000,579	204,969	3,448,711
Bonito.....	1,725,956	255,408	861,541	375,267	413,581	1,650,689
Cabezone.....	572,706		2,312			2,312
Cabrilla.....	8					
Carp.....	32,650		72,618	117,783	107,383	225,366
Catfish.....			170,580			72,618
Cutlus, Pacific.....	1,157	482	313,442			170,580
Eel.....			103			313,442
Flounder.....	46		369,630			103
Flying Fish.....	2,740		2,806	61,347	67,247	369,630
Grouper.....						2,806
Hake.....	45		41,981			128,594
Halibut, California.....	216,368	64,349	574,756	86,451	94,133	41,981
Halibut, Northern.....			233,462			755,340
Hardhead.....			92,822			233,462
Herring, Pacific.....			190,815			92,822
Kingfish.....	190,929	2,204	284,145	24	56	190,815
Mackerel, Horse.....	4,907,835	56,780	5,348,501	140		284,225
Mackerel, Pacific.....	48,707,505	1,786,228	52,966,454		21,131	5,348,641
Mackerel, Spanish.....				8,304	2,817	52,926,585
Mullet.....	15,174	34,843	50,017			11,181
Perch.....	10,666		57,999		85	50,017
Pike.....			173			58,084
Pompano, California.....	3,261		3,342			173
Rock Bass.....	29,235	22,371	90,586	3,197	17,315	3,342
Rockfish.....	164,158	22,323	1,265,300		145,114	111,098
Sablefish.....	16,809	64	1,965,460		120	1,410,414
Salmon.....			6,616,250			1,965,580
Sand Dab.....	10,998		353,540			6,616,250
Sardine.....	411,384,755	4,049,002	969,745,997		102	353,540
						969,746,099

Sculpin.....	42,283	1,588	44,092	233	44,332
Sea-bass, Black.....	3,746	4,675	13,537	136,809	377,396
Sea-bass, Short-fin.....		28			28
Sea-bass, White.....		14,424			553,595
Shad.....	129,297		356,498	91,207	2,571,633
Shark.....	545,609	186,605	2,571,633		3,417,493
Sheepshead.....	8,422	3,903	3,408,843	8,266	50,258
Skate.....	7,204	195	47,503	2,189	105,376
Skilpjack.....	201,855	15,933	105,151		38,715,182
Smelt.....	117,490	1,389	217,838		443,939
Sole.....	8,841	21	443,222	717	3,145,027
Split-tail.....			3,145,027		15,391
Sucker.....			15,391		85
Swordfish, Broadbill.....	137,158	33,262	416,431	29,477	445,908
Tomcod.....			145		145
Tuna, Bluefin.....	9,460,511	748,196	10,331,596		12,844,504
Tuna, Yellowfin.....	693	597	12,298,743	28,867,383	41,167,441
Turbot.....	15		6,571		6,571
Whitebait.....	4,859	375	159,258		159,258
Whitefish, Ocean.....	13,804	41,098	32,079	2,517	35,986
Yellowtail.....	27,137	229	55,017	1,583,406	2,725,955
Miscellaneous Fish.....			110,430	377	112,909
Total fish, in pounds.....	485,242,933	10,681,183	1,074,630,288	64,604,986	1,165,438,465
Crustacean:					
Crab.....	80		2,414,166		2,414,166
Shrimp.....			800,958		800,958
Spiny Lobster.....	54,592	42,608	168,641	591,556	769,621
Mollusk:					
Alalone.....			164,462		164,462
Clam, Cockle.....			257		257
Clam, Gaper.....			760		760
Clam, Pismo.....			93,613		184,592
Clam, Soft-shell.....			73,144		73,144
Clam, Washington.....			9,848		9,848
Octopus.....	15		7,396		7,396
Oyster, Eastern.....			92,426		92,426
Oyster, Japanese.....			606,233		606,233
Oyster, Native.....			5,682		5,682
Squid.....	30,240	33,766	938,738	4,045	943,783
Total shellfish, in pounds.....	84,927	76,374	5,380,324	595,601	6,076,328
Grand total, in pounds.....	485,327,860	10,757,557	1,080,010,612	65,200,587	1,171,514,793

## CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR OF 1942

## Canned

Kind of fish or fishery product	Size of cans	San Francisco district, cases	Monterey district, cases	San Pedro district, cases	San Diego district, cases	Total, cases
Albacore.....	1-lb.			3,199	177	3,376
	1½-lb.		6,257	124,948	103,966	235,171
	1¼-lb.				435	435
	1¼-lb. 100's			523		523
Anchovies.....	1¼-lb. 100's		261	242		503
Barracuda.....	1½-lb.			4,676		4,676
Bonito.....	1-lb.			746	276	1,022
	1½-lb.			17,369	13,897	31,266
Clams.....	No. 10, 6's			110		110
	1½-lb.			1,944		1,944
Clam juice.....	No. 10, 6's			7,926		7,926
Mackerel.....	4-lb. 12's				443	443
	1-lb.		4,539	579,053	17,456	601,048
	1½-lb.			8,815	3,220	12,035
	1¼-lb. 100's			664		664
Sardine.....	No. 10, 6's		1,106			1,106
	4-lb., 12's				63	63
	1-lb. oval	164,452	638,343	619,881		1,422,676
	1-lb. tall	164,363	498,946	1,342,030	1,222	2,006,561
	1½-lb.		8,283	1,707		9,990
	1½-lb. 96's		37,255	84,069		121,324
	1½-lb. filet		75,386			75,386
	5-oz. 100's	22,049	72,706	90,672		185,427
	¼-lb. sq. 100's		19,129	2,918		22,047
	3-oz. paste	2,205				2,205
Shad.....	1-lb.	20,058				20,058
Shad Roe.....	1½-lb.	4,887				4,887
Squid.....	1-lb. tail		941			941
Tuna, Bluefin.....	1-lb.			8,749		8,749
	12½ oz.			179		179
	1½-lb.			221,330	28,236	249,566
	1¼-lb.			1,507	177	1,684
	1¼-lb. 100's			18,920		18,920
Tuna, Striped.....	1-lb.			4,018	7,438	11,456
	1½-lb.			98,427	486,671	585,098
	1¼-lb.			8,539	93,315	101,854
	1¼-lb. 100's			17,996	3,170	21,166
Tuna, Yellowfin.....	4-lb., 12's			123		123
	1-lb.			7,939	16,567	24,506
	12½ oz.			1,919		1,919
	1½-lb.			192,413	498,707	691,120
	1¼-lb.			3,410	29,424	32,834
	1¼-lb. 100's			8,587	819	9,406
Tuna flakes.....	1-lb.			3,613	1,948	5,561
	1½-lb.			36,267	109,148	145,415
Tuna, "tonno" style.....	1½-lb.			383		383
	1¼-lb. 100's			23,096		23,096
Yellowtail.....	1-lb.			2,079	208	2,287
	1½-lb.			14,348	20,757	35,105
Pet food.....	Misc. sizes			197,403		197,403
Totals.....		378,014	1,363,152	3,762,737	1,437,740	6,941,643

NOTE: Forty-eight cans to the case unless otherwise specified. San Francisco District includes all area north of Monterey. San Pedro District includes Orange County.

## Cured and Manufactured

Fishery product	Size or quantity	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Anchovies, salted.....	Pounds.....		5,500			5,500
Mixed fish, dried.....	Pounds.....	47,002				47,002
Mixed fish, salted.....	Pounds.....				41,248	41,248
Sablefish, kippered.....	Pounds.....	236,863				236,863
Sablefish, salted.....	Pounds.....	72,000				72,000
Salmon, smoked.....	Pounds.....	104,206				104,206
Sardine, salted.....	Pounds.....		190,920			190,920
Shrimp, dried.....	Pounds.....	2,091				2,091
Shrimp, meal.....	Pounds.....	5,120				5,120
Stickwater residuum.....	Tons.....		195			195
Fish, meal.....	Tons.....	17,748	25,170	31,633	4,452	79,003
Fish, oil.....	Gallons.....	4,183,492	5,219,441	3,146,680	137,027	12,686,640
Shark liver oil.....	Gallons.....	148,043	49,097	63,795		260,935

## Miscellaneous Data

	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Estimated value of pack.....	\$8,812,250	\$12,570,434	\$27,042,118	\$19,007,887	\$67,432,689
Number of employees.....	1,665	3,380	5,172	2,033	12,250
Value of plants.....	\$3,578,273	\$3,923,808	\$4,418,812	\$1,626,931	\$13,547,824



## REPORT OF SARDINE CANNING AND REDUCTION PLANTS, SEASON 1942-1943

Compiled by S. H. DADO

Prior to the opening of the season fishermen and plant operators in San Francisco and Monterey with the aid of the OPA agreed on a price of \$22 per ton if the insurance was paid by the plants or \$22.50 per ton if the insurance was paid by the boat owners. In Monterey fishing operations were delayed a few days after August 1st adjusting cannery workers pay and differences between the C. I. O. and A. F. L. fishermen's unions. In San Francisco the first load of sardines came in on August 8th. In Monterey the first deliveries were made on August 12th. In southern California fishing started promptly on October 1st and was exceptionally heavy for the first two weeks of the season. Landings were above average for the first three months of the season.

Hearings were held June 25th by the Commission on 76 applications for permits to use sardines by a reduction or extraction process. At the Board meeting held on July 11th 75 permits for 4,750 tons each were granted. On October 17th two more permits were granted to Associated Sardine Cannery, Inc. and Del Mar Canning Company, Plant No. 2, both in Monterey. The permit was issued to Del Mar Canning Company since it was declared ready to operate but no permit was issued to the Associated Sardine Cannery, Inc. as their plant was not completed and ready to operate.

On January 8, 1943, additional permits for 1,000 tons each were granted and issued to 13 canning plants in the San Pedro district and on February 11th additional permits for 1,000 tons each were granted and issued to four canning plants in Monterey. On March 5th, a permit was granted and issued to Van Camp Sea Food Co., Inc. "I. P.-A. T." Plant to use 634 tons to cover fish taken in excess of permits the plant held.

Permits were issued for the season as shown in the following table:

<i>District</i>	<i>Number of Plants</i>	<i>Tons</i>
San Francisco -----	33	156,750
Monterey -----	23	113,250
San Pedro -----	16	89,634
San Diego -----	4	19,000
Totals -----	76	378,634

A transfer of 577 tons was made from the San Francisco district to be run in a Monterey plant.

Only 54.6 per cent of the reduction permit tonnage granted was received in the San Francisco district, 68.3 per cent in the Monterey district, 70.8 per cent in the San Pedro district, and 15 per cent in the San Diego district. In the four districts combined 60.6 per cent of the tonnage granted was received leaving an unused tonnage of 149,302 tons to be canceled at the close of the season.

The permits granted on July 11th provided that not more than one-third of the tonnage granted for the season could be taken in one calendar month. In the San Francisco and Monterey districts 700 tons and in southern California 950 tons was set as the minimum amount that could be taken during any one month during the season. These rulings on maximum and minimum monthly allotments were canceled on October 16th.

During the season 208 boats engaged in fishing sardines were operated on the following basis:

<i>Port of operations</i>	<i>Number of boats</i>
San Francisco only-----	19
Monterey only -----	66
San Pedro only-----	37
San Francisco and Monterey -----	20
San Francisco and San Pedro -----	18
Monterey and San Pedro-----	36
San Francisco, Monterey and San Pedro-----	12
Total -----	208

Of the total boats, 197 were purse seiners and 11 were small lampara type boats using ring nets. During the season five purse seiners were lost during storms, two at San Pedro and three at Monterey.

This report does not include sardines taken for fresh fish markets, bait, quarter oil pack, or fish packed after March 31st, in square cans of less than 10 ounces in weight.

The following plants operated during the season:

#### SAN FRANCISCO DISTRICT

Alaska Salmon Co., Richmond  
 American Sardine Co., Benicia  
 Benicia Fisheries (2 plants), Benicia  
 F. E. Booth Co., Inc. (2 plants), Pittsburg  
 California Fish Products Co., Richmond  
 Carquinez Fishery, Ltd., Richmond  
 Cypress Fisheries, San Francisco  
 East Bay Fisheries, Richmond  
 Edible Fish Meals & Oils, Richmond  
 Farallone Packing Co., Div. of Borden Co. (2 plants), San Francisco  
 Fish-Dee-Lish Corp., Richmond  
 Fish Packers, McNears Point

Gardenia Packing Co., Richmond  
Golden State Fisheries, Inc., Benicia  
Hofmann Packing Co., McNears Point  
Lansing Fisheries, San Francisco  
Martinez Food Cannery, Ltd., Martinez  
McGovern and McGovern, Richmond  
Northern Packing Corp., San Francisco  
Old Capitol Packers, Inc., McNears Point  
Ozol Packing Co., Martinez  
Pittsburg Cannery, Inc., Richmond  
Point Edith Fisheries, Ltd., Richmond  
Polarine Fisheries, Inc., Richmond  
Red Rock Fisheries, Inc. (2 Plants), Richmond  
Redondo Fish Products Co., Richmond  
Richmond Fisheries, Inc., Richmond  
San Pablo Fisheries, Richmond  
Tamalpais Fishing and Packing Co., Richmond

## MONTEREY DISTRICT

California Packing Corp., Monterey  
Carmel Canning Co., Monterey  
Custom House Packing Corp., Monterey  
Del Mar Canning Co. (2 plants), Monterey  
Edgewater Packing Co., Monterey  
E. B. Gross Canning Co. (2 plants), Monterey  
Hovden Food Products Corp. (2 plants), Monterey  
Hovden Food Products Corp. (2 plants), Moss Landing  
M. A. Leonis, Moss Landing  
Lucido Fisheries, Monterey  
Monterey Canning Co., Monterey  
Monterey Fish Products, Inc. (2 plants), Monterey  
Oxnard Cannery, Inc., Monterey  
Port Costa Packing Co., Moss Landing  
San Carlos Canning Co., Monterey  
San Xavier Fish Packing Co., Monterey  
Santa Inez Fisheries, Inc., Moss Landing  
Sea Pride Packing Corp., Ltd., Monterey

## SAN PEDRO DISTRICT

California Marine Curing & Packing Co., Terminal Island  
California Sea Food Co., Long Beach  
Coast Fishing Co., Wilmington  
Franco Italian Packing Co., Terminal Island  
French Sardine Co. of California, Inc. (2 plants), Terminal Island <sup>1</sup>  
K & M Fisheries, Inc., Terminal Island <sup>2</sup>  
Sardamack Fisheries, Inc., Wilmington  
Sea Pride Packing Corp., Ltd., Terminal Island

<sup>1</sup> Plant No. 2 burned Jan. 2, 1943.

<sup>2</sup> Plant burned Jan. 2, 1943.

South Coast Fisheries, Inc., Terminal Island <sup>3</sup>  
South Pacific Canning Co., Inc., Long Beach  
Southern California Fish Corp., Terminal Island  
Van Camp Sea Food Co., Inc. (3 plants), Terminal Island  
West Coast Packing Corp., Long Beach

## SAN DIEGO DISTRICT

American Fisheries Co., San Diego <sup>4</sup>  
High Seas Tuna Packing Co., Inc., San Diego  
Sun Harbor Packing Co., San Diego  
Westgate Sea Products Co., San Diego <sup>4</sup>

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<sup>3</sup> Plant burned Jan. 2, 1943.

<sup>4</sup> Permit issued, no sardines received.

## PRODUCTION OF SARDINE PLANTS

August 1, 1942, to March 31, 1943

District	Sardines received, tons	Used for canning, tons	Cannery fish overage used for meal and oil, tons	Used for meal and oil under permit, tons
San Francisco.....	115,586	20,657	9,344	85,585
Monterey.....	183,158	71,482	33,968	77,404
San Pedro.....	199,750	93,092	43,160	63,498
San Diego.....	2,847	-----	-----	2,847
Totals.....	501,341	185,231	86,472	229,334
Add cannery overage used for meal and oil.....	-----	86,472	-----	-----
Total tons received for canning purposes.....	-----	271,703	-----	-----

<sup>1</sup> The law requires that 13½ cases of 1-lb. oval cans be canned from each ton of sardines received for canning purposes, but in calculating the amount of fish actually used in canning, a basis of 20 cases per ton is used.

District	Cannery offal, tons	1-lb. ovals packed, cases	Other size cans packed, cases	Other size cans reduced to equivalent of 1-lb. ovals, cases	Cases, per ton
San Francisco.....	10,327	203,287	215,560	209,878	13.8
Monterey.....	35,770	705,317	750,376	724,335	13.5
San Pedro.....	46,546	491,690	1,377,143	1,370,383	13.6
San Diego.....	-----	-----	-----	-----	-----
Totals.....	92,643	1,400,294	2,343,079	2,304,596	-----

District	Sardine meal, tons	Ratio per ton of meal	Sardine oil, gallons	Gallons of oil per ton of fish and offal
San Francisco.....	19,114	5.5	4,467,454	42.4
Monterey.....	28,255	5.2	5,590,335	38.0
San Pedro.....	29,015	5.3	3,049,132	19.9
San Diego.....	599	4.8	41,862	14.7
Totals.....	76,983	-----	13,148,783	-----

District	Permits issued, tons	Unused permit tonnage cancelled tons	Used for other purposes, tons
San Francisco.....	156,750	70,588	-----
Monterey.....	113,250	36,423	304
San Pedro.....	89,634	26,136	-----
San Diego.....	19,000	16,153	-----
Totals.....	378,634	149,300	304

<sup>1</sup> 304 tons for salting.<sup>2</sup> 577 tons transferred San Francisco to Monterey.

COMPARATIVE STATEMENT OF SARDINE PLANT OPERATIONS,  
SEASONS 1941-1942 AND 1942-1943

## San Francisco District

	Season 1941-42	Season 1942-43	Increase
Tons of sardines received for canning.....	63,279	30,001	*33,278
Tons of sardines received under permit for meal and oil.....	121,381	85,585	*35,796
Tons of sardines received for pet food.....	1,261	-----	*1,261
Total tons of sardines received for all purposes.....	185,921	115,586	*70,335
Cases of 1-lb. oval cans packed.....	449,589	203,287	*246,302
Cases of other size cans packed.....	427,566	215,560	*212,006
Other size cans reduced to equivalent cases of 1-lb. ovals.....	405,120	209,878	*195,242
Meal, tons.....	29,935	19,114	*10,821
Oil, gallons.....	7,162,343	4,467,454	*2,694,889

\* Decrease.

## Monterey District

	Season 1941-42	Season 1942-43	Increase
Tons of sardines received for canning.....	179,549	105,450	*74,099
Tons of sardines received under permit for meal and oil.....	70,139	77,404	7,265
Tons of sardines received for salting.....	29	304	275
Total tons of sardines received for all purposes.....	249,717	183,158	*66,559
Cases of 1-lb. oval cans packed.....	1,098,747	705,317	*393,430
Cases of other size cans packed.....	1,413,846	750,376	*663,470
Other size cans reduced to equivalent cases of 1-lb. ovals.....	1,331,057	724,335	*606,722
Meal, tons.....	36,309	28,255	*8,054
Oil, gallons.....	7,222,683	5,590,335	*1,632,348

\* Decrease.

## San Pedro District

	Season 1941-42	Season 1942-43	Increase
Tons of sardines received for canning.....	123,396	136,252	12,856
Tons of sardines received under permit for meal and oil.....	18,633	63,498	44,865
Tons of sardines received for pet food.....	4,256	-----	*4,256
Total tons of sardines received for all purposes.....	146,285	199,750	53,465
Cases of 1-lb. oval cans packed.....	633,298	491,690	*141,608
Cases of other size cans packed.....	1,244,910	1,377,143	132,233
Other size cans reduced to equivalent cases of 1-lb. ovals.....	1,236,037	1,370,383	134,346
Meal, tons.....	18,590	29,015	10,425
Oil, gallons.....	2,088,695	3,049,132	960,437

\* Decrease.



## San Diego District

	Season 1941-42	Season 1942-43	Increase
Tons of sardines received for canning.....	68		*68
Tons of sardines received under permit for meal and oil.....	1,472	2,847	1,375
Total tons of sardines received for all purposes.....	1,540	2,847	1,307
Cases of 1-lb. oval cans packed.....	1,266		*1,266
Cases of other size cans packed.....	1,266		*1,266
Other size cans reduced to equivalent cases of 1-lb. ovals.....	269	599	330
Meal, tons.....			
Oil, gallons.....	25,244	41,862	16,618

\* Decrease.

## California, All Districts Combined

	Season 1941-42	Season 1942-43	Increase
Tons of sardines received for canning.....	366,292	271,703	*94,589
Tons of sardines received under permit for meal and oil.....	211,625	229,334	17,709
Tons of sardines received for pet food, salting, etc.....	5,546	304	*5,242
Total tons of sardines received for all purposes.....	583,463	501,341	*82,122
Cases of 1-lb. oval cans packed.....	2,181,634	1,400,294	*781,340
Cases of other size cans packed.....	3,087,588	2,343,079	*744,509
Other size cans reduced to equivalent cases of 1-lb. ovals.....	2,973,480	2,304,596	*668,884
Meal, tons.....	85,103	76,983	*8,120
Oil, gallons.....	16,498,965	13,148,783	*3,350,182

\* Decrease.

## SARDINE CATCH BY MONTHS, SEASON 1942-43

Month	San Francisco			
	Canning	Reduction	Other purposes	Total
August, 1942.....	4,628	27,640	-----	32,268
September.....	7,395	20,502	-----	27,897
October.....	4,766	14,015	-----	18,781
November.....	4,268	12,553	-----	16,821
December.....	4,118	5,252	-----	9,370
January, 1943.....	4,447	5,502	-----	9,949
February.....	379	121	-----	500
March.....	-----	-----	-----	-----
Totals.....	30,001	85,585	-----	115,586

Month	Monterey			
	Canning	Reduction	Other purposes	Total
August, 1942.....	14,430	16,202	41	30,673
September.....	28,989	19,717	167	48,873
October.....	7,268	4,098	2	11,368
November.....	13,185	12,889	44	26,118
December.....	16,921	10,477	-----	27,398
January, 1943.....	9,636	4,532	-----	14,168
February.....	14,294	9,489	50	23,833
March.....	727	-----	-----	727
Totals.....	105,450	77,404	304	183,158

Month	San Pedro			
	Canning	Reduction	Other purposes	Total
October, 1942.....	35,929	22,200	-----	58,129
November.....	32,720	20,371	-----	53,091
December.....	35,639	13,084	-----	48,723
January, 1943.....	19,308	7,554	-----	26,862
February.....	12,590	289	-----	12,879
March 1.....	66	-----	-----	66
Totals.....	136,252	63,498	-----	199,750

Month	San Diego			
	Canning	Reduction	Other purposes	Total
October, 1942.....	-----	331	-----	331
November.....	-----	827	-----	827
December.....	-----	1,042	-----	1,042
January, 1943.....	-----	647	-----	647
February.....	-----	-----	-----	-----
March 1.....	-----	-----	-----	-----
Totals.....	-----	2,847	-----	2,847

## PACK OF 1-LB. OVALS BY MONTHS, SEASON 1942-43

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total, cases
August, 1942	19,397	97,298			116,695
September	42,971	199,350			242,321
October	39,245	47,169	128,534		214,948
November	27,201	84,668	115,252		227,121
December	28,414	115,715	117,891		262,020
January, 1943	41,808	65,209	70,277		177,294
February	4,251	95,908	58,989		159,148
March			747		747
Totals	203,287	705,317	491,690		1,400,294

## PACK OF OTHER SIZE CANS REDUCED TO EQUIVALENTS OF 1-LB. OVALS, BY MONTHS, SEASON 1942-43

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total, cases
August, 1942	43,079	97,561			140,640
September	56,902	192,132			249,034
October	30,541	52,197	356,734		439,272
November	30,450	93,394	326,487		450,331
December	29,589	112,820	363,234		505,643
January, 1943	18,220	66,523	190,445		275,188
February	1,097	98,089	133,168		232,354
March		11,619	515		12,134
Totals	209,878	724,335	1,370,383		2,304,596

## SARDINE MEAL PRODUCTION BY MONTHS, SEASON 1942-43

Month	San Francisco, tons	Monterey, tons	San Pedro, tons	San Diego, tons	Total, tons
August, 1942	5,370	4,644			10,014
September	4,598	7,355			11,953
October	3,130	1,669	8,173	60	13,032
November	2,888	4,160	7,847	152	15,047
December	1,422	4,246	7,274	261	13,203
January, 1943	1,639	2,156	4,111	126	8,032
February	67	3,937	1,602		5,606
March		88	8		96
Totals	19,114	28,255	29,015	599	76,983

## SARDINE OIL PRODUCTION BY MONTHS, SEASON 1942-43

Month	San Francisco, gallons	Monterey, gallons	San Pedro, gallons	San Diego, gallons	Total, gallons
August, 1942	1,325,287	1,098,094			2,423,381
September	1,165,268	1,713,064			2,878,332
October	768,976	354,523	1,216,837	9,362	2,349,698
November	640,630	881,961	946,778	14,548	2,483,917
December	280,465	802,864	605,502	14,218	1,703,049
January, 1943	281,511	313,276	235,902	3,734	834,423
February	5,317	422,854	43,908		472,079
March		3,699	205		3,904
Totals	4,467,454	5,590,335	3,049,132	41,862	13,148,783

## CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1943

Compiled by Division of Fish and Game, Bureau of Marine Fisheries

Species of fish	Eureka region	Sacramento region	San Francisco region	Monterey region	Santa Barbara region
Albacore.....	488,361		474,332	300,549	294,675
Anchovy.....			78,793	198,432	
Barracuda.....				60	190,540
Bonito.....				112	367,637
Cabezone.....			140	7,379	13
Cabrilla.....					
Carp.....		16,735	506		
Catfish.....		209,485	40		
Corbina, Mexican.....					
Cultus, Pacific.....	478,755		151,410	84,802	1,857
Flounder.....	311,135		160,003	14,279	18,043
Flying Fish.....					
Grouper.....					
Hake.....	6,427		3,057	1,015	
Halibut, California.....			10,869	15,511	352,263
Halibut, Northern.....	269,991		1,070		
Hardhead.....		2,096			
Herring, Pacific.....	125,584		495,132	9,190	452
Kingfish.....			4,829	205,547	368
Mackerel, Horse.....		155,500	43	162,793	
Mackerel, Pacific.....		231,500	150,048	4,430,090	92,780
Mackerel, Spanish.....					
Mullet.....					
Perch.....	24,525		28,694	13,879	20,244
Pike.....		273			
Pompano, California.....			198	396	
Rock Bass.....					15,784
Rockfish.....	1,375,468		202,781	684,754	85,130
Sablefish.....	1,907,664	700	36,901	1,221,784	3,409
Salmon.....	2,176,182	1,295,424	2,021,123	1,101,934	
Sand Dab.....	280,395		143,862	75,023	
Sardine.....	462	73,645,540	171,029,377	439,702,334	362
Sculpin.....					1,680
Sea-bass, Black.....					1,832
Sea-bass, White.....	3,114		13,948	62,897	55,837
Shad.....		2,347,902	17	145	79
Shark.....	1,070,856		1,064,882	326,768	478,980
Sheepshead.....					96,653
Skate.....	16,696		34,116	16,777	4,292
Skipjack.....					
Smelt.....	66,851		965,644	292,011	10,107
Sole.....	3,449,278		996,257	86,134	232,647
Split-tail.....	72	10,925			
Swordfish, Broadbill.....					134,835
Tuna, Bluefin.....			43,182		275,899
Tuna, Yellowfin.....					
Turbot.....	6,401		13,196	705	17,745
Whitebait.....	137,880		3,487		
Whitefish, Ocean.....					22,412
Yellowtail.....					13
Miscellaneous Fish.....	49,150		26,117	2,169	19,966
Total fish, in pounds.....	12,245,247	77,916,080	178,154,054	449,017,469	2,796,534
Crustacean:					
Crab.....	229,058		2,021,556	64,724	
Shrimp.....			253,215	43	
Spiny Lobster.....					125,528
Mollusk:					
Abalone.....			5,891	100	631,558
Clam.....	728		120		
Clam, Pismo.....				1,759	44,111
Clam, Soft-shell.....			46,557		
Octopus.....	3,404		4,962	9,582	
Oyster, Eastern.....			79,878		
Oyster, Japanese.....			301,454		439,651
Oyster, Native.....			30,448		
Squid.....			39,060	9,065,688	
Total shellfish, in pounds.....	233,190		2,783,141	9,141,896	1,240,848
Grand total, in pounds.....	12,478,437	77,916,080	180,937,195	458,159,365	4,037,382

NOTE: All amounts shown in pounds. This record does not include albacore shipped from Oregon and Washington or fish imported from South America or the Gulf of California. This record is the catch made in or off the regions shown in the tables.

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1943—Continued  
Compiled by Division of Fish and Game, Bureau of Marine Fisheries

Species of fish	Los Angeles region	San Diego region	Total taken in State waters and off the coast of California	South of International Boundary brought into Los Angeles	South of International Boundary brought into San Diego	Total landings in California, including fish from west coast south of the International Boundary brought in by boat
Albacore	6,565,745	3,762,153	11,885,815	1,100,893	8,398,156	21,384,864
Anchovy	1,293,493	85	1,570,803	989,116	402,428	1,570,803
Barracuda	1,855,780	356,504	2,382,584	958,270	522,079	3,774,428
Bonito	400,842	32,944	801,535	186,930	46,106	2,281,884
Cabezone			7,532			7,532
Cabrilla						233,036
Carp			17,241			17,241
Catfish			209,525			209,525
Corbina, Mexican						5,106
Cutrus, Pacific	1,273	1,031	719,128	5,076	30	719,318
Flounder	1,939		505,399		190	505,399
Flying Fish	2,271		2,271			2,271
Grouper						81,887
Hake	297,096	35,155	10,499		43,115	10,499
Halibut, California			710,894	206,004	201,846	1,118,744
Halibut, Northern			271,061			271,061
Hardhead			2,096			2,096
Herring, Pacific			630,358			630,358
Kingfish	183,534	2,219	396,497		27	396,524
Mackerel, Horse	12,379,755	883	12,698,974	250	11,939	12,698,974
Mackerel, Pacific	69,698,555	645,338	75,248,811	6,043	12,609	75,261,000
Mackerel, Spanish					7,218	18,652
Mullet		63,063	66,063			73,281
Pike	25,408		112,750	213		112,963
Pompano, California	4,549	25	273			273
Rock Bass	106,919	21,500	5,168			5,168
Rockfish	198,374	11,395	144,203	12,177	25,097	181,447
Sablefish	34,147		2,555,902	26,255	177,473	2,750,630
Salmon			3,204,005		1,469	3,205,074
Sand Dab	6,058		6,394,663			6,594,663
Sardine	282,710,040	5,160,375	505,338			505,338
Sculpin	29,372	4,931	972,243,490		525	972,249,015
			35,983		6,567	42,550

Sea-bass, Black	7,280	10,159	13,271	430,512	250,419	700,202
Sea-bass, White	215,244	28,138	379,178	69,408	51,512	500,098
Shad			2,348,143			2,348,143
Shark	571,637	203,627	3,716,800	2,891	3,038	3,722,729
Sheepshead	25,608	2,437	124,698	2,927	20,822	147,547
Skate	9,098		80,909	200		81,109
Stripjack	15,573	2,331	17,004	6,991,375	21,984,505	28,893,754
Snook	226,108	368	1,501,084	151	776	1,362,011
Sole	17,866	5	4,782,177	167	35	4,782,379
Split-tail			10,997			10,997
Swordfish, Broadbill	174,502	8,231	317,028			336,386
Tuna, Bluefin	6,763,490	581,316	7,663,887	2,217,911	296,372	10,178,170
Tuna, Yellowfin	385	1,673	2,058	19,058,888	30,200,382	49,261,328
Turbot			38,047			38,047
Whitebait			141,367			141,367
Whitefish, Ocean	17,862	1,741	42,015	4,901	49,096	96,012
Yellowtail	17,043	16,303	33,359	4,018,596	882,924	4,934,879
Miscellaneous Fish	61,072	2	158,476	1,177	924	160,577
Total fish, in pounds	383,896,008	10,957,367	1,114,982,759	36,328,203	63,516,407	1,214,827,369
Crustacean:						
Crab			2,315,338			2,315,338
Shrimp			283,258			283,258
Spiny Lobster	120,481	52,308	298,377	178,902	508,246	985,525
Mollusk:						
Abalone	42,725		630,274			630,274
Clam			848			848
Clam, Pismo			45,870	356,849	208,915	611,634
Clam, Soft-shell			46,557			46,557
Octopus	72		18,020			18,020
Oyster, Eastern			79,878			79,878
Oyster, Japanese			741,105			741,105
Oyster, Native			30,448			30,448
Squid	27,213	32,400	9,164,361			9,164,361
Total shellfish, in pounds	190,491	84,768	13,674,334	535,751	717,163	14,927,248
Grand total, in pounds	384,086,499	11,042,135	1,128,657,093	36,863,954	64,233,568	1,229,754,615



## CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1943

## Canned

Kind of fish or fishery product	Size of cans	San Francisco district, cases	Monterey district, cases	San Pedro district, cases	San Diego district, cases	Total, cases
Albacore	1-lb.			2,280	17,435	19,715
	$\frac{1}{2}$ -lb.		11,342	184,772	209,906	406,020
	$\frac{1}{4}$ -lb.				6	6
Anchovy	$\frac{1}{4}$ -lb., sq. 100's		87			87
Barracuda	1-lb.			389		389
Bonito	$\frac{1}{2}$ -lb.			352		352
	$\frac{1}{2}$ -lb.			28,463	6,457	34,920
	$\frac{1}{4}$ -lb.				353	353
Clams	$\frac{1}{2}$ -lb.			10,225		10,225
Clam juice	No. 10, 6's			906		906
Mackerel	1-lb.	20	7,997	827,040	4,255	839,312
Sardine	No. 10, 6's	32,523				32,523
	1-lb. ovals	270,005	775,446	400,504		1,445,955
	1 lb. tall	89,966	742,968	846,314	697	1,679,945
	10 $\frac{1}{2}$ oz., E. O.	3,514				3,514
	$\frac{1}{2}$ -lb. sq.	2,934	25,526			28,460
	$\frac{1}{2}$ -lb. 96's	1,506	53,537	44,516		99,559
	$\frac{1}{2}$ -lb. filet		44,935			44,935
	5-oz. 100's	10,104	10,176	26,507		46,787
	$\frac{1}{4}$ -lb. sq. 100's		16,193	2,235		18,428
Salmon	$\frac{1}{4}$ -lb. 100's	1,475				1,475
Shad	1-lb.	11,516				11,516
Shad Roe	$\frac{1}{2}$ -lb. oval	6,252				6,252
Skipjack	1-lb.			1,981	3,856	5,837
	$\frac{1}{2}$ -lb.			84,592	285,236	369,828
	$\frac{1}{4}$ -lb.			403	5,872	6,275
	$\frac{1}{4}$ -lb. 100's			1,227		1,227
Squid	1-lb.		112,175	80		112,255
	$\frac{1}{2}$ -lb.		6,982			6,982
Tuna, Bluefin	1-lb.			2,159	162	2,321
	$\frac{1}{2}$ -lb.			160,685	11,859	172,544
Tuna, Yellowfin	1-lb.			23,952	41,505	65,457
	$\frac{1}{2}$ -lb.			268,513	350,609	619,122
	$\frac{1}{4}$ -lb.			11,416		11,416
	$\frac{1}{4}$ -lb. 100's			214		214
Tuna flakes	1-lb.			4,624	179	4,803
	$\frac{1}{2}$ -lb.			115,924	381,788	497,712
Tuna, "tonno" style	$\frac{1}{2}$ -lb.			1,041		1,041
	$\frac{1}{4}$ -lb. 100's			16,198		16,198
Yellowtail	1-lb.			4,530		4,530
	$\frac{1}{2}$ -lb.			63,250	5,488	68,738
Totals		429,815	1,807,364	3,135,292	1,325,663	6,608,134

NOTE: Forty-eight cans to the case unless otherwise specified. San Francisco District includes all area north of Monterey. San Pedro District includes Orange County.

## Cured and Manufactured

Fishery product	Size or quantity	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Anchovy, salted.....	Pounds.....		4,000			4,000
Mackerel, salted.....	Pounds.....		34,000			34,000
Mixed fish, dried.....	Pounds.....	64,037				64,037
Mixed fish, smoked.....	Pounds.....	12,553				12,553
Sablefish, kippered.....	Pounds.....	230,241				230,241
Salmon, mild cure.....	Tierces.....	226				226
Salmon, smoked.....	Pounds.....	86,650				86,650
Sardine, salted.....	Pounds.....		135,350			135,350
Shad, mild cure.....	Pounds.....	92,800				92,800
Shrimp, dried.....	Pounds.....	2,075				2,075
Shrimp, meal.....	Pounds.....	4,500				4,500
Fish, meal <sup>1</sup> .....	Tons.....	19,682	37,416	24,753	4,300	86,151
Fish, oil.....	Gallons.....	4,979,798	6,652,715	2,262,889	120,777	14,016,179
Liver oil.....	Gallons.....	188,826	90,939	77,509		357,274

<sup>1</sup> Includes 4,160 tons of residuum from stickwater.

## Miscellaneous Data

	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
Estimated value of pack.....	\$10,608,935	\$17,048,271	\$27,180,215	\$15,658,679	\$70,496,100
Number of employees.....	1,906	3,308	5,158	1,771	12,143
Value of plants.....	\$3,933,244	\$4,368,836	\$5,324,824	\$2,416,886	\$16,043,790

## REPORT OF SARDINE CANNING AND REDUCTION PLANTS, SEASON 1943-1944

Compiled by S. H. DADO

Price for sardines was set by the O. P. A., prior to the opening of the season, at \$22 per ton plus insurance.

Fish were delivered in the San Francisco District on August 5 and in the Monterey District on August 2. In southern California deliveries started on the opening day of the season, October 1. Hearings on 82 applications for permits to use sardines by a reduction process were held on June 2 in Los Angeles, and permits were granted to 82 applicants to be issued when the plant was equipped and ready to operate. Prior to the opening of the season, 74 permits for 4,750 tons each were issued; and one additional plant in the San Francisco District qualified and was issued a permit in October for 3,270 tons, a deduction from the basic tonnage being made as the plant was not ready to operate on opening of the season. On December 15 an additional grant of 1,000 tons was made to such plants as could show need for such additional tonnage to continue operations. Thirteen plants in the Monterey District, and three plants in the San Pedro District were issued additional permits for 1,000 tons each.

Permits were issued for the season, as shown in the following table:

<i>District</i>	<i>No. of plants</i>	<i>Tons issued</i>	<i>Tons used</i>	<i>Tons unused</i>
San Francisco -----	34	160,020	95,332	64,688
Monterey -----	22	117,002	96,826	20,176
San Pedro -----	16	79,000	46,912	32,088
San Diego -----	3	14,250	2,663	11,587
Totals-----	75	370,272	241,733	128,539

In the Monterey district 498 tons of permit tonnage was revoked, and has been deducted in the above table.

Of the permit tonnage issued, only 59.6% was used in the San Francisco District, 82.7% in the Monterey District, 59.4% in the San Pedro District, and 18.7% in the San Diego District. For the entire State, 65.3% of the permit tonnage issued was used.

The permits were issued without any limitation on the amount of fish that could be received monthly.

During the season there were 206 boats engaged in fishing sardines, of which 197 were purse seine boats, and 9 were lampara type boats, using ring nets. These boats were operated during the season, as follows:

<i>Port of operation</i>	<i>No. of boats</i>
San Francisco, exclusively-----	10
Monterey, exclusively -----	59
San Pedro, exclusively-----	41
San Francisco and Monterey-----	37
San Francisco and San Pedro-----	38
Monterey and San Pedro-----	15
San Francisco, Monterey, and San Pedro-----	6
Total-----	206

This report does not include sardines taken for fresh fish markets, bait or fish packed after March 31st, in square cans of less than 10 ounces in weight.

The following plants operated during the season :

#### SAN FRANCISCO DISTRICT

Alaska Salmon Co., Richmond  
 American Sardine Co., Benicia  
 Benicia Fisheries (2 plants), Pittsburg  
 F. E. Booth Co., Inc. (2 plants), Pittsburg  
 California Fish Products Co., Richmond  
 Carquinez Fishery, Ltd., Richmond  
 Cypress Fisheries, San Francisco  
 East Bay Fisheries, Richmond  
 Edible Fish Meals & Oils, Richmond  
 Farallone Packing Co., Div. of Borden Co. (2 plants),  
 San Francisco  
 Fish-Dee-Lish Corp., Richmond  
 Fish Packers, McNears Point  
 Gardenia Packing Co., Richmond  
 Golden State Fisheries, Benicia  
 Hofmann Packing Co., McNears Point  
 Lansing Fisheries, San Francisco  
 Martinez Food Cannery, Ltd., Martinez  
 McLaughlin, Harold, Richmond  
 Monitor Fisheries, Richmond  
 Northern Packing Corp., San Francisco  
 Old Capitol Packers, McNears Point  
 Ozol Packing Co., Martinez  
 Pittsburg Cannery, Inc., Richmond  
 Point Edith Fisheries, Ltd., Richmond  
 Polarine Fisheries, Inc., Richmond  
 Red Rock Fisheries, Inc. (2 plants), Richmond  
 Redondo Fish Products Co., Richmond  
 Richmond Fisheries, Inc., Richmond  
 San Pablo Fisheries, Richmond  
 Tamalpais Fishing and Packing Co., Richmond

## MONTEREY DISTRICT

California Packing Corp., Monterey  
Carmel Canning Co., Monterey  
Custom House Packing Corp., Monterey  
Del Mar Canning Co., Monterey  
Edgewater Packing Co., Monterey  
Hovden Food Products Corp. (2 plants), Monterey  
Hovden Food Products Corp., Moss Landing  
Lone Wolf Packing Co., Moss Landing  
Lucido Fisheries, Monterey  
Monterey Canning Co., Monterey  
Monterey Fish Products, Inc. (2 plants), Monterey  
Oxnard Cannery, Inc., Monterey  
Peninsula Packing Co. (2 plants), Monterey  
Port Costa Packing Co., Moss Landing  
San Carlos Canning Co., Monterey  
San Xavier Fish Packing Co., Monterey  
Santa Inez Fisheries, Inc., Moss Landing  
Sea Pride Packing Co., Monterey  
Western Fish Products Co., Moss Landing

## SAN PEDRO DISTRICT

California Marine Curing & Packing Co., Terminal Island  
California Sea Food Co., Long Beach  
Coast Fishing Co., Wilmington  
Franco Italian Packing Co., Terminal Island  
French Sardine Co. of California, Inc. (2 plants), Terminal Island  
Golden State Sea Food Co., Long Beach  
K & M Fisheries, Inc., Terminal Island  
Sardamack Fisheries, Wilmington  
South Coast Fisheries, Inc., Terminal Island  
South Pacific Canning Co., Inc., Long Beach  
Southern California Fish Corp., Terminal Island  
Terminal Island Sea Foods, Ltd., Terminal Island  
Van Camp Sea Food Co., Inc. (3 plants), Terminal Island  
West Coast Packing Corp., Long Beach  
West Coast Packing Corp., Newport Beach

## SAN DIEGO DISTRICT

High Seas Tuna Packing Co., Inc., San Diego  
Sun Harbor Packing Co., San Diego  
Westgate Sea Products Co., San Diego

## PRODUCTION OF SARDINE PLANTS

August 1, 1943, to March 31, 1944

District	Sardines received, tons	Used for canning, tons	Cannery fish overage used for meal and oil, tons	Used for meal and oil under permit, tons
San Francisco.....	126,132	21,269	9,531	95,332
Monterey.....	212,383	78,147	37,148	96,826
San Pedro.....	132,317	58,047	27,358	46,912
San Diego.....	2,690	27	-----	2,663
Totals.....	473,522	157,490	74,037	241,733
Add cannery overage used for meal and oil.....	-----	74,037	-----	-----
Total tons received for canning purposes.....	-----	231,527	-----	-----

<sup>1</sup> The law requires that 13½ cases of 1-lb. oval cans be canned from each ton of sardines received for canning purposes, but in calculating the amount of fish actually used in canning, a basis of 20 cases per ton is used.

District	Cannery offal, tons	1-lb. ovals packed, cases	Other size cans packed, cases	Other size cans reduced to equivalent of 1-lb. ovals, cases	Cases, per ton
San Francisco.....	10,631	277,724	153,866	147,763	13.8
Monterey.....	39,076	747,978	821,082	815,058	13.5
San Pedro.....	29,019	377,420	781,934	783,633	13.6
San Diego.....	14	-----	697	697	25.8
Totals.....	78,740	1,403,122	1,757,579	1,747,151	-----

District	Sardine meal, tons	Ratio of wet material per ton of meal	Sardine oil, gallons	Gallons of oil per ton of fish and offal
San Francisco.....	20,064	5.7	5,018,816	43.5
Monterey.....	32,840	5.2	6,578,416	38.0
San Pedro.....	20,081	5.1	2,135,162	20.7
San Diego.....	527	5.1	50,617	18.9
Totals.....	73,512	-----	13,783,011	-----

District	Permits issued, tons	Unused permit tonnage cancelled, tons	Used for other purposes, tons
San Francisco.....	160,020	64,688	-----
Monterey.....	117,002	20,176	1262
San Pedro.....	79,000	32,088	-----
San Diego.....	14,250	11,587	-----
Totals.....	370,272	128,539	1262

<sup>1</sup> 262 tons for salting.



**COMPARATIVE STATEMENT OF SARDINE PLANT OPERATIONS,  
SEASONS 1942-43 AND 1943-44**

**San Francisco District**

	Season 1942-43	Season 1943-44	Increase
Tons of sardines received for canning.....	30,001	30,800	799
Tons of sardines received under permit for meal and oil.....	55,585	95,332	9,747
Tons of sardines for salting.....			
Total tons of sardines received for all purposes.....	115,586	126,132	10,546
Cases of 1-lb. oval cans packed.....	203,287	277,724	74,437
Cases of other size cans packed.....	215,560	153,866	*61,694
Other size cans reduced to equivalent of 1-lb. ovals.....	209,878	147,763	*62,115
Meal, tons.....	19,114	20,064	950
Oil, gallons.....	4,467,454	5,018,816	551,362

\* Decrease.

**Monterey District**

	Season 1942-43	Season 1943-44	Increase
Tons of sardines received for canning.....	105,450	115,295	9,845
Tons of sardines received under permit for meal and oil.....	77,404	96,826	19,422
Tons of sardines received for salting.....	304	262	*42
Total tons of sardines received for all purposes.....	183,158	212,383	29,225
Cases of 1-lb. ovals packed.....	705,317	747,978	42,661
Cases of other size cans packed.....	750,376	821,082	70,706
Other size cans reduced to equivalent of 1-lb. ovals.....	724,335	815,058	90,723
Meal, tons.....	28,255	32,840	4,585
Oil, gallons.....	5,590,335	6,578,416	988,081

\* Decrease.

**San Pedro District**

	Season 1942-43	Season 1943-44	Increase
Tons of sardines received for canning.....	136,252	85,405	*50,847
Tons of sardines received under permit for meal and oil.....	63,498	46,912	*16,586
Totals.....	199,750	132,317	*67,433
Cases of 1-lb. oval cans packed.....	491,690	377,420	*114,270
Cases of other size cans packed.....	1,377,143	781,934	*595,209
Other size cans reduced to equivalent cases of 1-lb. ovals.....	1,370,383	783,633	*586,750
Meal, tons.....	29,015	20,081	*8,934
Oil, gallons.....	3,049,132	2,135,162	*913,970

\* Decrease.

## San Diego District

	Season 1942-43	Season 1943-44	Increase
Tons of sardines received for canning.....		27	27
Tons of sardines received under permit for meal and oil.....	2,847	2,663	*184
Total tons of sardines received for all purposes.....	2,847	2,690	*157
Cases of 1-lb. oval cans packed.....		697	697
Cases of other size cans packed.....		697	697
Other size cans reduced to equivalent cases of 1-lb. ovals.....		527	*72
Meal, tons.....	599	527	
Oil, gallons.....	41,862	50,617	8,755

\* Decrease.

## California, All Districts Combined

	Season 1942-43	Season 1943-44	Increase
Tons of sardines received for canning.....	271,703	231,527	*40,176
Tons of sardines received under permit for meal and oil.....	229,334	241,733	12,399
Tons of sardines received for salting.....	304	262	*42
Total tons of sardines received for all purposes.....	501,341	473,522	*27,819
Cases of 1-lb. oval cans packed.....	1,400,294	1,403,122	2,828
Cases of other size cans packed.....	2,343,079	1,757,579	*585,500
Other size cans reduced to equivalent cases of 1-lb. ovals.....	2,304,596	1,747,151	*557,445
Meal, tons.....	76,983	73,512	*3,471
Oil, gallons.....	13,148,783	13,783,011	634,228

\* Decrease.

## SARDINE CATCH BY MONTHS, SEASON 1943-44

Month	San Francisco			
	Canning	Reduction	Other purposes	Total
August, 1943.....	4,515	16,432	-----	20,947
September.....	10,813	62,644	-----	73,457
October.....	2,956	2,445	-----	5,401
November.....	4,710	4,834	-----	9,544
December.....	1,674	389	-----	2,063
January, 1944.....	5,968	8,333	-----	14,301
February.....	164	255	-----	419
Totals.....	30,800	95,332	-----	126,132

Month	Monterey			
	Canning	Reduction	Other purposes	Total
August, 1943.....	19,040	7,609	-----	26,649
September.....	22,810	23,092	-----	45,902
October.....	14,171	9,683	25	23,879
November.....	18,643	21,772	50	40,465
December.....	20,873	22,015	74	42,962
January, 1944.....	13,733	10,821	64	24,618
February.....	5,989	1,834	49	7,872
March.....	36	-----	-----	36
Totals.....	115,295	96,826	262	212,383

Month	San Pedro			
	Canning	Reduction	Other purposes	Total
October, 1943.....	31,430	17,754	-----	49,184
November.....	14,055	6,104	-----	20,159
December.....	17,921	11,623	-----	29,544
January, 1944.....	16,410	9,971	-----	26,381
February and March 1.....	5,589	1,460	-----	7,049
Totals.....	85,405	46,912	-----	132,317

Month	San Diego			
	Canning	Reduction	Other purposes	Total
October, 1943.....	-----	631	-----	631
November.....	14	831	-----	845
December.....	13	424	-----	437
January, 1944.....	-----	768	-----	768
February.....	-----	9	-----	9
Totals.....	27	2,663	-----	2,690

## PACK OF 1-LB. OVALS BY MONTHS, SEASON 1943-44

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total, cases
August, 1943	40,708	124,945			165,653
September	97,418	144,589			242,007
October	31,247	83,509	119,903		234,659
November	40,348	121,154	69,505		231,007
December	12,143	140,160	81,084		233,387
January, 1944	55,472	91,911	75,053		222,436
February	388	41,710	31,875		73,973
March					
Totals	277,724	747,978	377,420		1,403,122

## PACK OF OTHER SIZE CANS REDUCED TO EQUIVALENTS OF 1-LB. OVALS, BY MONTHS, SEASON 1943-44

Month	San Francisco, cases	Monterey, cases	San Pedro, cases	San Diego, cases	Total, cases
August, 1943	20,252	135,729			155,981
September	48,601	163,436			212,037
October	9,518	107,867	310,141		427,526
November	23,720	130,652	121,478	357	276,207
December	10,969	142,123	161,092	340	314,524
January, 1944	32,281	93,761	146,881		272,923
February	2,422	40,995	44,041		87,458
March		495			495
Totals	147,763	815,058	783,633	697	1,747,151

## SARDINE MEAL PRODUCTION BY MONTHS, SEASON 1943-44

Month	San Francisco, tons	Monterey, tons	San Pedro, tons	San Diego, tons	Total, tons
August, 1943	3,239	3,558			6,797
September	12,015	6,940			18,955
October	789	3,668	7,219	117	11,793
November	1,297	6,491	3,147	154	11,089
December	309	7,002	4,586	97	11,994
January, 1944	2,344	3,921	4,150	157	10,572
February	71	1,255	979	2	2,307
March		5			5
Totals	20,064	32,840	20,081	527	73,512

## SARDINE OIL PRODUCTION BY MONTHS, SEASON 1943-44

Month	San Francisco, gallons	Monterey, gallons	San Pedro, gallons	San Diego, gallons	Total, gallons
August, 1943	811,233	779,287			1,590,520
September	3,247,398	1,715,873			4,963,271
October	224,920	749,362	1,075,203	16,397	2,065,882
November	353,538	1,411,859	373,732	19,638	2,158,767
December	50,100	1,254,368	436,781	6,603	1,747,852
January, 1944	322,338	539,941	212,325	7,939	1,082,543
February	9,289	127,681	37,121	40	174,131
March		45			45
Totals	5,018,816	6,578,416	2,135,162	50,617	13,783,011

## SARDINE CATCH, CASE PACK, MEAL AND OIL PRODUCTION

For Sardine Packing Seasons

Sardine Catch, Tons

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	248	69,011	61,992	5,214	136,465
1926-27	2,653	76,690	64,216	-----	143,559
1927-28	11,066	98,678	67,459	3,973	181,176
1928-29	12,757	119,102	119,180	1,394	232,433
1929-30	20,655	159,434	140,432	2,079	322,600
1930-31	24,468	108,953	38,580	-----	172,001
1931-32	19,938	68,825	42,557	-----	131,320
1932-33	17,417	89,257	83,492	-----	190,166
1933-34	35,467	151,937	124,950	1,488	313,842
1934-35	67,140	229,992	178,755	4,859	480,746
1935-36	74,231	184,113	138,333	10,489	407,166
1936-37	139,429	206,229	137,914	4,569	488,141
1937-38	132,248	104,464	109,015	107	345,834
1938-39	200,361	180,090	145,335	2,790	528,576
1939-40	211,471	227,231	93,081	95	531,878
1940-41	117,817	165,145	170,559	1,188	454,709
1941-42	185,921	249,717	146,285	1,540	583,463
1942-43	115,586	183,158	199,750	2,847	501,341
1943-44	126,132	212,383	132,317	2,690	473,522

## Sardines, 1-Lb. Ovals, Cases

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	3,892	937,014	968,495	66,074	1,975,475
1926-27	51,657	1,150,859	986,858	-----	2,189,374
1927-28	110,911	1,363,251	878,175	39,380	2,391,717
1928-29	114,446	1,405,746	1,140,488	12,383	2,673,063
1929-30	206,478	1,797,566	1,493,615	16,551	3,514,210
1930-31	266,598	1,069,627	403,041	-----	1,739,266
1931-32	269,586	720,518	470,796	-----	1,460,900
1932-33	157,469	253,000	321,794	-----	732,263
1933-34	221,798	748,706	526,540	-----	1,497,044
1934-35	264,505	629,779	591,759	-----	1,486,343
1935-36	336,554	919,497	680,103	-----	1,936,154
1936-37	198,621	818,909	629,802	-----	1,647,332
1937-38	127,214	502,194	553,306	-----	1,182,714
1938-39	172,454	687,287	630,998	-----	1,490,739
1939-40	196,011	1,092,981	545,182	-----	1,834,174
1940-41	168,700	622,219	672,780	-----	1,463,699
1941-42	449,589	1,098,747	633,298	-----	2,181,634
1942-43	203,287	705,317	491,690	-----	1,400,294
1943-44	277,724	747,978	377,420	-----	1,403,122

## Other Size Cans Reduced to Equivalents of 1-Lb. Ovals, Cases

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26	-----	35,956	16,361	13,065	65,382
1926-27	-----	21,673	63,264	-----	84,937
1927-28	40,825	14,160	145,143	31,995	232,123
1928-29	69,886	45,778	173,540	10,368	299,572
1929-30	79,224	90,238	458,416	12,552	640,430
1930-31	69,932	176,384	170,388	-----	416,704
1931-32	8,381	43,816	159,066	-----	211,263
1932-33	5,129	10,815	75,775	-----	91,719
1933-34	9,846	113,842	331,631	5,396	460,715
1934-35	12,025	142,535	222,661	13,058	390,279
1935-36	39,597	594,191	627,117	19,856	1,280,761
1936-37	42,986	469,296	819,859	9,573	1,341,714
1937-38	33,763	326,543	756,369	1,040	1,117,715
1938-39	51,658	376,076	655,303	-----	1,083,037
1939-40	90,628	670,420	539,666	80	1,300,794
1940-41	119,713	597,627	934,975	452	1,652,767
1941-42	405,120	1,331,057	1,236,037	1,266	2,973,480
1942-43	209,878	724,335	1,370,383	-----	2,304,596
1943-44	147,763	815,058	783,633	697	1,747,151

## Sardine Meal, Tons

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26.....	20	6,393	5,962	467	12,842
1926-27.....	228	6,447	5,962	-----	12,637
1927-28.....	1,183	9,355	7,128	184	17,850
1928-29.....	1,387	12,395	14,802	140	28,724
1929-30.....	2,282	16,671	16,258	251	35,462
1930-31.....	2,716	11,490	4,317	-----	18,523
1931-32.....	2,303	7,825	4,911	-----	15,039
1932-33.....	2,297	14,370	14,060	-----	30,727
1933-34.....	5,073	22,206	19,166	262	46,707
1934-35.....	10,571	36,396	29,836	848	77,651
1935-36.....	11,604	26,933	19,422	1,945	59,904
1936-37.....	23,686	31,867	18,735	827	75,115
1937-38.....	23,058	15,383	14,525	15	52,981
1938-39.....	34,751	28,859	22,066	537	86,213
1939-40.....	36,324	34,568	12,145	16	83,053
1940-41.....	20,541	25,805	24,560	216	71,122
1941-42.....	29,935	36,309	18,590	269	85,103
1942-43.....	19,114	28,255	29,015	599	76,983
1943-44.....	20,064	32,840	20,081	527	73,512

## Sardine Oil, Gallons

Season	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1925-26.....	2,629	1,110,983	658,817	43,995	1,816,424
1926-27.....	60,967	1,501,384	682,796	-----	2,245,147
1927-28.....	257,989	1,601,993	711,579	10,253	2,581,814
1928-29.....	288,055	2,651,524	2,178,815	6,857	5,125,251
1929-30.....	474,530	3,887,472	1,986,704	11,071	6,359,777
1930-31.....	763,643	3,363,912	630,011	-----	4,757,566
1931-32.....	612,181	2,143,161	762,701	-----	3,517,983
1932-33.....	574,958	3,761,387	2,161,476	-----	6,497,821
1933-34.....	1,175,401	4,819,900	3,242,899	24,303	9,262,503
1934-35.....	2,514,588	9,379,239	4,865,486	111,252	16,870,565
1935-36.....	3,196,286	6,854,372	2,939,863	210,171	13,200,692
1936-37.....	5,509,905	6,814,184	1,898,134	77,700	14,299,923
1937-38.....	4,659,147	3,067,587	1,447,631	912	9,175,277
1938-39.....	7,804,909	5,462,066	2,197,757	37,325	15,502,057
1939-40.....	9,313,706	7,090,963	984,851	472	17,389,992
1940-41.....	4,809,853	5,197,570	2,369,300	21,587	12,398,310
1941-42.....	7,162,343	7,222,683	2,088,695	25,244	16,498,965
1942-43.....	4,467,454	5,590,335	3,049,132	41,862	13,148,783
1943-44.....	5,018,816	6,578,416	2,135,162	50,617	13,783,011

## Sardine Oil Production, Gallons per Ton

Season	San Francisco district	Monterey district	San Pedro district	San Diego district
1930-31.....	47.5	43.2	26.3	-----
1931-32.....	47.1	43.1	28.5	-----
1932-33.....	43.0	45.6	29.1	-----
1933-34.....	39.6	37.0	31.3	17.7
1934-35.....	41.7	44.5	30.7	24.7
1935-36.....	49.9	46.8	27.9	21.0
1936-37.....	41.3	39.1	18.9	17.9
1937-38.....	36.3	36.6	19.3	11.1
1938-39.....	40.2	35.6	19.8	13.4
1939-40.....	45.5	38.7	15.5	5.0
1940-41.....	43.8	38.6	18.7	18.3
1941-42.....	43.8	38.2	21.9	16.7
1942-43.....	42.4	38.0	19.9	14.7
1943-44.....	43.5	38.0	20.7	18.9



## CASE PACK, MEAL AND OIL PRODUCTION FOR CALENDAR YEARS 1928-1944

## Sardines, 1-Lb. Ovals, Cases

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	109,198	1,402,237	945,676	39,755	2,496,966
1929	204,878	1,834,648	1,438,159	12,225	3,489,910
1930	237,159	1,342,249	863,254	15,500	2,458,162
1931	307,575	696,640	498,996	-----	1,503,211
1932	125,737	334,019	415,874	-----	875,630
1933	239,917	598,616	365,750	-----	1,204,283
1934	292,216	798,942	531,619	-----	1,622,777
1935	301,455	825,011	615,808	-----	1,742,274
1936	225,185	864,498	586,038	-----	1,675,721
1937	101,912	577,405	761,776	-----	1,441,093
1938	164,559	556,477	600,532	-----	1,321,568
1939	225,462	1,023,285	627,524	-----	1,876,271
1940	178,316	755,639	664,241	-----	1,598,196
1941	459,454	1,142,052	689,210	-----	2,290,716
1942	164,452	638,343	619,881	-----	1,422,675
1943	270,005	775,446	400,504	-----	1,445,955
1944	228,561	822,836	434,414	-----	1,485,811

## Sardines, Other Size Cans, Cases

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	82,207	49,022	153,376	33,759	318,364
1929	71,546	77,340	286,135	16,528	451,549
1930	79,108	160,293	346,472	25,489	611,362
1931	17,929	77,785	192,641	3,425	291,780
1932	4,366	23,719	90,489	7,641	126,215
1933	10,226	81,458	116,301	10,592	218,577
1934	8,505	125,740	284,241	10,463	428,949
1935	28,383	477,103	273,565	11,437	790,488
1936	66,421	505,865	549,679	22,863	1,144,828
1937	18,290	411,817	1,099,513	12,491	1,542,111
1938	45,059	385,580	693,000	19,056	1,142,695
1939	96,331	647,743	705,588	229	1,449,891
1940	138,571	664,801	786,484	37	1,589,893
1941	436,487	1,424,558	1,240,748	2,775	3,104,568
1942	188,617	712,811	1,521,396	1,285	2,424,109
1943	140,547	893,335	919,572	697	1,954,151
1944	281,470	979,491	987,888	-----	2,248,849

## Fish Meal, Tons

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	1,589	10,986	12,923	2,367	27,865
1929	2,576	16,640	20,040	3,565	42,821
1930	3,375	13,752	13,653	4,859	35,639
1931	3,597	8,416	7,600	2,827	22,440
1932	2,435	12,560	9,846	2,659	27,500
1933	4,941	18,869	18,249	4,310	46,369
1934	11,138	34,492	27,236	4,558	77,724
1935	12,994	27,966	31,163	6,572	78,695
1936	24,593	30,431	23,588	7,655	86,267
1937	22,916	21,118	29,184	8,300	81,518
1938	31,773	25,202	24,209	6,732	87,916
1939	43,369	33,238	21,858	6,704	105,169
1940	21,256	28,004	29,542	7,335	86,137
1941	32,773	38,875	25,832	5,332	102,812
1942	17,748	25,170	31,633	4,452	79,003
1943	19,682	33,626	24,383	4,300	81,991
1944	24,452	42,452	34,945	5,283	107,132

Includes meal produced from sardines and other species of fish, and residuum from stickwater.

## Fish Oil, Gallons

Year	San Francisco district	Monterey district	San Pedro district	San Diego district	Total
1928	282,043	2,174,673	1,268,518	24,068	3,749,302
1929	454,726	3,750,392	2,280,991	62,017	6,548,126
1930	747,931	3,769,950	1,282,893	41,989	5,842,763
1931	726,514	2,372,303	818,364	7,511	3,924,692
1932	426,831	3,378,929	1,293,961	25,678	5,125,399
1933	933,696	4,209,366	2,585,784	58,948	7,787,794
1934	2,490,156	9,322,080	4,221,447	94,525	16,128,208
1935	3,106,785	6,734,305	3,821,566	261,482	13,924,138
1936	5,626,422	6,756,541	2,834,887	260,059	15,477,909
1937	4,431,668	4,122,817	2,578,600	191,757	11,324,842
1938	7,032,792	4,753,160	2,126,661	130,606	14,043,219
1939	10,395,398	6,894,201	1,594,122	96,806	18,980,527
1940	4,531,500	5,745,120	2,509,291	129,079	13,214,990
1941	7,429,493	7,537,870	2,627,959	81,876	17,677,198
1942	4,183,492	5,219,441	3,146,680	137,027	12,686,640
1943	4,979,798	6,652,715	2,262,889	120,777	14,016,179
1944	5,722,966	8,509,678	3,903,785	133,356	18,269,785

Includes oil produced from sardines and other species of fish, except vitamin oil from livers.















